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ABSTRACT

The two studies reported here investigate the role of experiential factors in the development of creative thinking of children and adolescents. The first assigned 400 male students from six high schools in the New York metropolitan area to four criterion groups of 100 each: (1) Creative Art or Writing, (2) Creative/Scientific, (3) Control Art or Writing, and, (4) Control/Scientific. A 165 question biographical inventory, prepared especially for this study, covered four specific areas: physical characteristics, family history, educational history, and leisure-time activities. Other questions were included. The subjects were also given the Barron-Welsh Art Scale, the Gough Adjective Check List, and the Franck Drawing Completion Test. The procedure in the second study, using 400 female students from seven New York City high schools, paralleled very closely that of the first study. The principal difference was that the girls' study concentrated on a more intensive exploration of the artistic and writing fields. An intensive program of creativity training for the elementary school level was developed, which proved to be of limited success and only with middle class children. Certain products were developed which were suitable for general use, including both assessment and training materials. (Author/JM)

Final Report

CORRELATES OF CREATIVITY IN CHILDREN FROM TWO SOCIOECONOMIC LEVELS

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INTRODUCTION

The major underlying purpose of the present project was to investigate the role of experiential factors in the development of creative thinking in children and adolescents. In the pursuit of this basic objective, a three-pronged approach was followed. First, the correlates of high-level creative achievement in high school boys and girls were studied through biographical inventories and tests; the results of this research are summarized in Chapter I. Second, an exploratory investigation was conducted into the variables of home environment associated with creativity among fifth- and sixth-grade elementary school children; this study is reported in Chapter II. Third, an intensive program of creativity training for the elementary school level was developed and evaluated, as discussed in Chapter III.

In the course of the project, certain products were developed which are suitable for general use. Including both assessment and training materials, these products are described in Chapter IV.

Additional by-products of the principal research are to be found in a number of supplementary studies summarized in Chapter V. Because of the large samples screened and investigated in the principal studies, a "data bank" was accumulated which permitted a variety of additional analyses. Some of these analyses provided tests of special hypotheses pertaining to creativity. Others were directed toward methodological contributions, concerned with the development and evaluation of tests and other assessment techniques. Still another source of supplementary studies may be traced to the catalytic influence of conducting a major research project in a university setting. By focusing attention on the area of creativity, the ongoing project stimulated and channeled other research activity in this direction. The result was a number of related

studies of creativity on the populations investigated in the principal project.

At the end of this report is appended a project bibliography, including both published articles and books and in-house mimeographed reports and progress reports.

CHAPTER I

BIOGRAPHICAL AND PERSONAL CORRELATES OF CREATIVITY IN HIGH SCHOOL STUDENTS

Two independent studies of the correlates of creativity were conducted with high school students: the first with boys, the second with girls. Both employed an extensive biographical inventory as the primary instrument, together with certain specially selected tests.

THE BOYS' STUDY[1]

Procedure

The subjects employed in the principal data analyses were 400 male students from six high schools in the New York metropolitan area. Chosen because they offer courses or programs providing an opportunity for creative achievement, these schools included: Forest Hills, Jamaica, Midwood, Stuyvesant (public high schools in New York City), Bronxville (a suburban public high school), and Regis (a private high school conducted by the Jesuit order in New York City). The group included 188 seniors, 144 juniors, and 68 sophomores. Socio-economic level and parental education of the entire sample were superior for the geographical area.

Four criterion groups, of 100 students each, were formed as follows: Creative-Art-or-Writing (CrAW), Control-Art-or-Writing (CoAW), Creative-Scientific (CrS), and Control-Scientific (CoS). The creative subjects had to meet two criteria: (1) teacher nomination on the basis of one or more creative

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[1]The data for the boys' study were gathered as part of an earlier project supported by grant No. MH 10233-01 from the National Institute of Mental Health. Data analyses and interpretations were completed within the present project.

products to be described on a Teachers' Nomination Form; (2) score above a minimum cutoff on Guilford's Alternate Uses and Consequences tests. The "artistic" category covered graphic art and literary expression; the "scientific" included sciences and mathematics.

The control subjects were nominated by the same teachers as having produced no evidence of creative achievement and they also scored below a maximum cutoff on the two Guilford screening tests. The control subjects were matched with the creative subjects in school attended, class, and grade-point average (GPA). Since the CrS students significantly excelled the CrAW students in GPA, two separate control groups were assembled. In order to obtain the four groups of 100 students each in accordance with the above specifications, it proved necessary to screen a total of nearly 1,000 students through teacher nominations and screening tests.

A 165-question biographical inventory was prepared for this study, the questions having being formulated principally on the basis of previous research findings and hypotheses regarding the correlates of creativity. The questions were grouped into five sections, labeled Physical Characteristics, Family History, Educational History, Leisure-Time Activities, and Miscellaneous. Although some multiple-choice and checklist items were included in this initial form of the biographical inventory, many questions were open ended. Even with the objective items, moreover, there was provision for adding other, unlisted responses. Maximum flexibility was thus permitted to the subject in filling out the questionnaire. All responses were coded prior to tabulation. For each question there were several possible responses, and for some questions this number was quite large. In addition, several questions yielded responses that could be classified from different viewpoints to test different hypotheses. As a result, the 165 questions yielded a total of 3,930 "scorable items" or individual response alternatives. The 400 subjects were also given the Barron-

Welsh Art Scale, the Gough Adjective Check List, and the Franck Drawing Completion Test.

The biographical inventory and the three tests were administered to groups varying from 30 to 180 students during a single 2-hour testing session held outside of school hours. The subjects were paid for participating in this testing session. Identification numbers were employed to provide anonymity, and the students were assured of the confidentiality of the data.

For purposes of data analysis, each of the four criterion groups was further subdivided into two groups of 50 each, used for development of scoring keys and cross-validation, respectively. Each of these pairs of groups was equated in number of students from each school, class distribution, GPA, and mean score on the screening tests. For each of the 3,930 scorable items, classified as present or absent, a phi coefficient was computed against the dichotomous criterion of creative vs. control. These coefficients were computed separately in art-writing and scientific criterion groups. On the basis of these phi coefficients, the initial scoring keys were developed for the CrAW and CrS groups.

The two scoring keys thus developed were then employed in scoring the biographical inventories of the corresponding creative and control subjects in the cross-validation samples. The scorers were unaware of the criterion status of the subjects. The scores thus obtained were correlated with the dichotomous criterion to provide an estimate of the validity of the scoring keys. In order to utilize all the data in the selection of items for final keys, item analyses were carried out independently in initial and cross-validation samples and those items were selected for the final keys that differentiated between criterion and control groups with a compound probability of $p < .05$.

Results

The results of the cross-validation of the two initial keys are summarized

Table 1

Biographical Inventory Scores of Criterion Groups in Cross-Validation Samples: Boys

Measure	Creative-Art-Writing Key		Creative-Scientific Key	
	CrAW	CoAW	CrS	CoS
Number of Cases	50	50	50	50
Mean	88.76	52.38	53.50	41.62
SD	19.58	24.32	17.69	13.91
Range	52-140	3-110	4-84	17-72
NCR	8.23*		3.74*	
$r_{p_{bis}}$	.64*		.35*	

*$p < .001$.

in T ble 1. In both CrAW and CrS group, mean scores of creative subjects excelled those of controls at a very high level of statistical significance ($p < .001$). The point-biserial criterion correlations, having the same significance levels, were .64 and .35 in the art-writing and scientific groups, respectively. It is thus apparent that the biographical inventory constructed in this study differentiated very successfully between creative and control subjects.

Once the validity of the initial keys was established, the final keys were constructed with items whose compound probability was based on data obtained from the total sample (100 cases in each subgroup). The CrAW key thus developed contains 110 scorable items, while the CrS key contains 65. An examination of

the items in these final keys provides the clearest available description of the characteristics of the creative students surveyed in the present study. This description will be summarized in the last section of this chapter, in combination with the results obtained in the girls' study.

It should be noted that in all comparisons--including mean differences, criterion correlations, extent of overlap of score distributions, and number of significantly differentating items in initial and final scoring keys--the CrAW students were more sharply differentiated from their controls than were the CrS students. It should be recalled in this connection that in both groups creative and control subjects were equated in GPA and the CrS students significantly excelled CrAW students in this regard. From many sources of evidence it appears that the CrS high school student resembles the academically superior student more closely than does the CrAW student. Both the nature of scientific creativity itself and current educational practices in science courses suggest that high academic achievement--together with its characteristic antecedents and correlates--plays a predominant role in scientific creativity. On the other hand, the traditional activities of artists and writers, as well as the content of courses in these areas, differ quite conspicuously from typical academic activities. These facts probably account in part for the better differentiation of CrAW students from their controls.

THE GIRLS' STUDY

Procedure

The procedure followed in the girls' study paralleled very closely that reported for the boys' study. The principal difference was that the girls' study concentrated on a more intensive exploration of the artistic and writing fields, which were now studied separately rather than being combined as in the boys'

study. These two fields were chosen for further investigation because in the earlier study differentiation between creative and control groups was greater in the combined art and writing sample than in the science sample. Among high school girls, moreover, outstanding creative achievement in art or writing is more frequent than it is in science.

The subjects employed in the principal data analyses were 400 female students from seven public high schools in greater New York: Abraham Lincoln, Art and Design, Erasmus Hall, Forest Hills, Jamaica, Midwood, and Music and Art. These schools were chosen because they offer courses or programs providing opportunities for creative activities and because they have outstanding records of awards, prizes, and other indications of creative student achievement in art or writing. Of the 400 girls, 246 were seniors, 128 juniors, and 26 sophomores. As in the boys' study, the group as a whole was superior with regard to educational and occupational level of parents. Criterion groups were assembled by the identical procedures followed in the boys' study; they comprised 100 subjects in each of four groups designated as follows: Creative-Art (CrA), Control-Art (CoA), Creative-Writing (CrW), and Control-Writing (CoW). A total of 1,114 nominees from the seven schools were screened for this purpose.

Except for minor changes, the biographical inventory employed in this study was the same as that prepared in the boys' study. It consisted of 166 questions yielding a total of 3,962 scorable items employed in the initial item analyses. The same three supplementary tests were also administered in this study.

Results

Application of the initial scoring keys to the cross validation samples yielded the results summarized in Table 2. As in the boys' study, the means of creative and control groups on both art and writing keys differ at a high level

of statistical significance ($p < .001$). Point-biserial correlations of the biographical inventory scores with the dichotomous criterion are .34 in the art

Table 2

Biographical Inventory Scores of Criterion Groups in Cross-Validation Samples: Girls

Measure	Creative-Art Key		Creative-Writing Key	
	CrA	CoA	CrW	CoW
Number of Cases	50	50	50	50
Mean	61.26	50.00	104.40	76.24
SD	15.65	15.04	21.57	20.87
Range	24-94	23-89	54-149	39-136
NCR	3.67*		6.63*	
$r_{p_{bis}}$	.34*		.55*	

*$p < .001$.

group and .55 in the writing group. It is again apparent that the keys developed for the biographical inventory successfully differentiated between creative and control subjects.

Following cross-validation of the initial keys, final keys were constructed with items whose compound probability was derived from the total samples. The final art key contained 40 items and the final writing key 82 items.

It should be noted that, in both the boys' and the girls' studies, the obtained differences between creative and control groups are somewhat minimized by the design of the experiment. First, creative and control subjects were equated in grade-point average, although there is evidence that high school grades

are in fact positively related to creative achievement. Second, the creative and control subjects were enrolled in the same courses and attended high schools noted for the creative achievement of their students. The second condition applies more strongly to the girls than to the boys, and more strongly to the art than to the writing group. Thus a large proportion of girls in the art sample were enrolled in special high schools whose students are selected on the basis of superior artistic talents. This fact undoubtedly explains, at least in part, the finding that differentiation between creatives and controls was less sharp in the art than in the writing group. Not only were the mean difference and the criterion correlation higher in the writing than in the art group, but the number of significantly differentiating items in the final keys is also larger for the writing than for the art key. For all groups investigated, however, it should be borne in mind that the present study is concerned with the differentiation of the more highly creative subjects within an academically superior and talented population.

CHARACTERISTICS OF THE HIGHLY CREATIVE ADOLESCENT

When the results of both studies are brought together, a number of characteristics emerge as differentiating between creative adolescents and their respective controls regardless of field or sex. Among the most clearly differentiating biographical characteristics of highly creative adolescents are the following:

(1) A pervasive and continuing enthusiasm for their chosen fields, coupled with a singleness of purpose in the pursuit of these fields;

(2) A predominance of unusual experiences in their past history and a strong drive toward novelty, diversity, and fantasy in their activities;

(3) A greater breadth of interests, as evidenced in their scholastic, extra-curricular, and avocational activities;

(4) A greater incidence of leadership roles in childhood and adolescence;

(5) A strong intellectual and "cultural" orientation, which seems related to an academically and culturally superior familial background;

(6) A greater tendency for parents to provide role models of interest and creative expression in the field in which the adolescent achieved creatively;

(7) A tendency for the creative adolescents to have received early recognition and reinforcement for their creative works in the form of exhibitions, publication, prizes, or awards;

(8) A greater influence of the opposite-sex parent on the creative adolescents, boys showing more evidence of maternal influence, girls of paternal influence.

These findings from the biographical inventory are corroborated and clarified by some of the results obtained with the supplementary tests. For example, on the Franck Drawing Completion Test, the creative subjects tended more often than the controls to produce drawings that were asymmetrical, elaborated, and original. Similarly, on the Barron-Welsh Art Scale, when significant differences were found, the creatives tended to prefer the more dynamic, asymmetrical, and complex drawings. On the Adjective Check List, the statistically significant scale differences suggested more impulsivity, craving for novelty, autonomy, and self-assertion on the part of the creative adolescents. Other differences on the ACL suggest that the creative adolescent is more "open" to all facets of his personality, more willing to accept and acknowledge unusual or unconventional behavior, and less defensive in his self-description. Finally, it should be added that certain qualitative differences in experiential backgrounds and personality characteristics can be identified among fields, but the similarities are far greater than the differences.

More detailed reports and fuller discussions of the research summarized in this chapter can be found in the following published articles listed in the Project Bibliography: Anastasi & Schaefer, 1969, 1971a; Schaefer, 1968, 1969b, 1969c; Schaefer & Anastasi, 1968; Smith & Schaefer, 1969.

CHAPTER II

VARIABLES OF HOME ENVIRONMENT ASSOCIATED WITH CREATIVITY IN CHILDREN

With regard to its effect on human development, environment cannot be described in terms of a single continuum ranging from "favorable" to "unfavorable." The type of environment that is more conducive to the development of one characteristic may be detrimental to the development of another. The optimal environments for physical vigor, acacemic achievement, independence, and social conformity are probably quite dissimilar. Accordingly, it was the purpose of this phase of the project to investigate the specific "sub-environment" conducive to the development of creativity in school-age children. Relatively little research has been concerned directly with the assessment of such a sub-environment. One approach is through biographical material provided retrospectively by creative adolescents or adults, as illustrated by the biographical inventory studies reported in Chapter I. An alternative approach involves the investigation of home backgrounds through direct observation or parental interviews. It is the latter procedure that was followed in the present study.

PROCEDURE

Subjects

The subjects employed in the principal data analyses included 100 boys and girls from the fifth and sixth grades of three public elementary schools in the Bronx, New York (P.S. 8, P.S. 94, and P.S. 95). In an effort to obtain subjects with similar backgrounds, these particular schools were chosen because they are located in the same school district and are in the same middle-income area. They are also educationally comparable and were recently rated as being among the most

outstanding New York City schools in academic achievement. The subjects were equally divided with regard to sex, comprising 22 boys and 22 girls from the fifth grade, and 28 boys and 28 girls from the sixth grade. Only children residing within the school district were included in the study.

The total sample was divided into the following four criterion groups of 25 subjects each: Creative Boys, Control Boys, Creative Girls, Control Girls. The subjects in the creative groups were chosen from among the children nominated by their classroom teachers for some specific creative achievement. In addition, they were required to score above a predetermined cutoff point on a battery of three creativity tests: the Unusual Uses and Incomplete Figures tests from the Torrance Tests of Creative Thinking, and a Similes test developed within the present project. All three tests were scored for originality and their scores combined with equal weight. The children in the control groups were nominated by their teachers as being academically comparable to the creative nominees, but not having produced any concrete evidence of original work in the classroom. For each sex, the creative and control groups were equated in educational level and academic grade. All four criterion groups proved to be above the general school average in academic grades. In order to assemble the four matched criterion groups of 100 children, it was necessary to screen a total of 500 fifth- and sixth-grade children in the three schools.

Home Interviews

An interview schedule was constructed to cover environmental variables most frequently found in previous research to have been associated with creativity. For scoring purposes, the total of 150 interview items were grouped into 24 scales, each scale designed to assess a relevant environmental variable. Examples of such variables include creative activities by the parents themselves serving as "role models," facilities for creative activities available to the child,

variety of intellectual and "cultural" activities in the home, independence allowed the child, flexibility in the household (as to schedules, planning, responsibility for chores, etc.), and degree of parental acceptance of child's regressive behavior. Separate scales for mother and father were employed for all items pertaining to parental behavior and attitudes. The scales were scored independently by two raters to determine scorer reliability. Scales yielding low scorer reliability (less than .65) or insufficient dispersion of scores were eliminated from the final analysis.

The home interviews were conducted by two members of the project staff, without knowledge of the child's criterion status (creative or control). All interviews were conducted with the subjects' mothers. Participation in the study was solicited by letter and arrangements were made by a follow-up telephone call. The mothers were assured of the complete confidentiality of the interview. Following the administration of the interview schedule, each mother was given a list of 16 adjectives and asked to check those she felt to be most characteristic and those she felt to be least characteristic of her child. These acjectives were compiled from those previously found to differentiate most clearly between self-descriptions of creative and control adolescents and adults. Finally, each mother was given the entire Gough Adjective Check List to be filled out as a description of herself. This test was subsequently scored for the 24 available trait scales. The duration of individual interviews ranged from 1 hour to 2½ hours.

RESULTS

Comparison of Criterion Groups on Home Environment Scales

The scores obtained by the children in the four criterion groups on the individual home environment scales were submitted to a two-way analysis of

variance, with creativity and sex as the main effects. In the case of a few scales yielding markedly skewed distributions, the results were analyzed by non-parametric procedures. The central tendencies and variabilities of the four criterion groups in the 19 scales retained for statistical analysis are given in Table 3.

Few statistically significant group differences were demonstrated by these analyses. The creative groups were characterized by a significantly greater variety of the child's own intellectual-cultural activities and interests; and the difference between creative and control groups in this respect was significantly greater for boys than for girls. The girls as a whole participated in significantly more creative activities at home than did the boys; but among the boys, the creative group participated in significantly more creative activities than did the control boys, while the creative girls did not differ significantly in this respect from their controls. These differences suggest certain interesting interactions between sex and creativity which are further borne out by other findings. Two significant differences, for example, illustrate the influence of the opposite-sex parent on the creative child, also found in the biographical inventory study reported in Chapter I and in prior published research by other investigators. The creative boys significantly excelled the control boys in encouragement given the child by the mother to engage in creative activities. The creative girls, on the other hand, significantly excelled the control girls in degree of acceptance by the father of child's regressive behavior.

Although other group differences were not large enough to reach statistical significance with the size of samples employed, several of them are suggestive because of their corroboration of research findings previously obtained by other approaches. For example, for both boys and girls, the creative groups obtained higher means than the controls in the scales assessing independence allowed the

Table 3: Part 1

Central Tendency and Variability of Home Environment

Scales for Criterion Groups

Scale	Criterion Group							
	Creative Boys		Control Boys		Creative Girls		Control Girls	
	Median	Q	Median	Q	Median	Q	Median	Q
1. Extent of mother's creative behavior	1.23	0.54	1.19	0.70	1.09	0.30	1.12	0.31
2. Extent of father's creative behavior	1.15	0.31	1.06	0.28	1.19	0.45	1.06	0.28
5. Encouragement given child by mother to engage in creative activities	3.74	1.60	1.39	1.21	3.75	1.38	4.00	0.94
6. Encouragement given child by father to engage in creative activities	1.33	1.42	1.19	0.45	3.33	1.87	3.13	1.21
7. Value placed on creative activities by mother	1.09	0.30	1.28	1.49	1.15	0.31	1.19	0.70
8. Value placed on creative activities by father	1.12	0.31	1.06	0.28	1.19	0.51	1.04	0.27
21. Degree of acceptance by mother of child's regressive behavior	3.60	1.73	4.13	2.08	3.86	1.27	2.38	1.88
22. Degree of acceptance by father of child's regressive behavior	2.58	1.53	3.00	1.29	3.38	1.25	1.86	1.13

Note.--Table 3 continued on the following page.

Table 5. Part II

Central Tendency and Variability of Home Environment

Scales for Criterion Groups

Scale	Criterion Group							
	Creative Boys		Control Boys		Creative Girls		Control Girls	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
9. Variety of materials available to child for creative activities	4.12	1.53	3.56	1.42	4.60	1.55	4.32	1.62
11. Variety of moether's intellectual/ cultural activities and interests	3.72	1.61	3.80	1.44	3.80	1.52	3.56	1.33
12. Variety of father's intellectual/ cultural activities and interests	3.24	1.53	3.24	1.66	3.16	1.43	3.36	1.32
13. Variety of intellectual/cultural activities and interests in home	4.28	1.54	3.68	1.43	4.12	1.34	4.16	1.22
14. Encouragement given child by mother to engage in intellectual/cultural activities	3.56	1.02	3.60	1.23	3.76	1.18	4.08	1.06
15. Encouragement given child by father to engage in intellectual/cultural activities	3.12	0.91	3.28	1.48	3.40	1.33	3.56	1.30
16. Independence allowed child	4.24	0.99	3.92	1.23	4.40	0.98	4.24	0.99
17. Flexibility in household	5.04	1.31	4.80	1.41	4.72	1.69	4.56	1.10
20. Degree of free expression allowed child	4.68	1.19	4.92	1.35	4.68	1.64	4.72	0.96
23. Extent of child's creative activities	3.56	1.27	2.68	1.46	4.52	1.50	4.64	1.23
24. Variety of child's intellectual/cultural activities and interests	4.16	1.12	3.04	1.04	3.44	1.67	3.36	1.23
Total Score	63.36	12.22	60.32	13.17	67.72	14.32	64.84	9.36

child and flexibility in the household, as well as the scale measuring variety of materials available to the child for creative activities. Less rigid adherence to conventional sex stereotypes in the homes of the creative children is suggested by the greater encouragement given to creative boys than control boys to engage in creative activities and by the greater parental acceptance of regressive behavior on the part of creative than control girls.

Despite there interesting trends and the few significant group differences obtained, a noteworthy result of this study is the absence of conspicuous differences between the home environments of creative and control groups. Thus a number of early home environment variables that differentiated between older creative and control subjects in retrospective investigations failed to differentiate significantly in the present study. Because this was an exploratory study and because relatively little is known from direct study of home environments during childhood, it should be profitable to consider possible reasons for the lack of differentiation.

First, it will be recalled that both creative and control groups were superior in academic achievement and were equated in this regard. It is possible that at the age level studied the type of home environment conducive to high academic achievement has much in common with that conducive to creative behavior, although such environments may become increasingly differentiated for older subjects.

Second, among the creative achievers at the fifth- and sixth-grade levels may be some who—partly because of the nature of their home environments--will become increasingly creative as they move into adolescence and adulthood, while others will gradually lose their creative drives and decline in creative achievement. This situation would produce a heterogeneity of home characteristics within the present creative groups and would thereby reduce the differentiation

between creative and control homes. On the other hand, the retrospective study of adolescents and adults who have remained creative would more clearly identify the early home characteristics conducive to continuing creative development. Only a longitudinal study of a group of school-age children could test this hypothesis.

A third point is also related to the particular developmental period investigated. It is likely that parental behavior varies in systematic ways at different developmental stages. For instance, the encouragement of 11- and 12-year old children to engage in creative activities may be fairly general among middle-class parents; but only if such parental encouragement continues as the child grows into adolescence would it act as a cumulative reinforcement and thus differentiate between the homes of creatives and controls. It is also possible that entirely different types of parental behavior are critical for the development of creativity at different stages in the child's development. Published research provides some evidence for such period-specific influences with regard to intellectual development. Again, a longitudinal study would seem most appropriate. In addition, comprehensive case studies of individual highly creative children might reveal some of the periodespecific environmental variables not otherwise identifiable.

Supplementary Measures

On the 16 adjectives from which the mothers were to identify those most or least characteristic of their children, few significant differences were again found. It should be noted that these responses need not represent the child's actual traits. They are undoubtedly at least partly a reflection of the mother's perception of the child and of her concept of desirable characteristics in an 11- to 12-year old boy or girl. The creative boys were described as "imaginative" significantly more often than their controls and the creative girls as "assertive"

significantly more often than their controls. A corroborative finding was a significantly greater number of times "assertive was chosen as least characteristic of controls as compared to creative girls. Both of these adjectives occur more frequently in the self-descriptions of creatives than those of control subjects obtained in other studies. Of particular interest in the present study, however, is the fact that "imaginative," which characterized the creative boys, is more commonly associated with the female sex stereotype, while "assertive," which characterized the creative girls, is more commonly associated with the male sex stereotype. Such a finding fits in which the previously noted deviations from conventional sex roles and expectations and the suggestion that the homes of creatives allow such divergence.

The second supplementary measure was the complete Adjective Check List which each mother completed by marking those adjectives she considered self-descriptive. A comparison of the mothers in the four criterion groups on the 24 scales available for this test yielded a single statistically significant difference, the mothers of the creatives scoring lower than the mothers of the controls on the Abasement scale. Although mean differences in the other scales are not large enough to reach statistical significance, they present a picture quite similar to that found when creative and control adolescents were compared in their self-descriptions on this test (see Chapter I).

It is noteworthy that other studies in this project (Domino, 1969; Schaefer, 1970), in which the personality characteristics of the mothers of creative adolescents were investigated, did yield significant differences. The traits differentiating the mothers of creative from the mothers of control adolescents in these studies closely paralleled those differentiating the creative from control adolescents themselves. The small differences found in the present study may have resulted from some of the same conditions cited earlier to account for the lack of differentiation in the home environment scales

Factor Analysis of Home Environment Scales

In order to throw additional light on the nature and interrelationships of the home environment variables, the 19 home environment scales were factor analyzed. Tetrachoric correlations among the 19 variables were computed for the combined sample of 100 cases. To avoid spurious correlations that might result from group differences, each of the four criterion groups was dichotomized at its own median on each variable. The data for the four criterion groups were then combined and tetrachoric correlations computed. The 19 variables were factor analyzed by means of the IBM/360 Scientific Subroutine Package Program for Computation of Factor Analysis. This is a principal components solution which terminates when the eigenvalue is less than 1. Six factors were extracted by this method and these six factors were rotated to an orthogonal simple structure by the Varimax procedure. The resulting factor pattern for the total sample is presented in Table 4. Variables with loadings of $\pm$.40 or higher have been underlined and were considered in naming each factor.

On the basis of these factor loadings, the six factors characterizing the home environments of the children were identified as follows:

Factor I: Interest in creative activities by culturally-oriented parents, particularly the father. This factor describes a home in which both parents appreciate and participate in a wide range of enriching cultural experiences, such as playing a musical instrument, attending plays and concerts, visiting art galleries and museums, and reading. Both parents encourage creative activities in the child and participate with him in such activities.

Factor II: Encouragement given the child to engage in intellectual-cultural activities by permissive parents. This factor denotes a home that combines encouragement of intellectual and cultural activities in the child with flexibility and some permissiveness.

Factor III: Degree of impulsivity and free expression allowed the child. In homes rating high on this factor, both mother and father are tolerant of impulsive and regressive behavior on the part of the child and allow him considerable freedom of expression.

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Table 4

Factor Matrix based on Intercorrelations of 19 Home Environment Scales

Home Environment Scale	Factor I	II	III	IV	V	VI	h^2
1. Extent of mother's creative behavior	.200	-.007	-.015	.840	.245	-.055	.809
2. Extent of father's creative behavior	.744	.109	.156	.248	.247	-.010	.713
5. Encouragement given child by mother to engage in creative activities	.509	.392	-.132	-.034	.293	.485	.753
6. Encouragement given child by father to engage in creative activities	.376	.015	-.199	.033	.012	.724	.706
7. Value placed on creative activities by mother	.418	.185	-.241	.719	.157	-.011	.809
8. Value placed on creative activities by father	.868	-.033	-.065	-.069	.178	.165	.823
9. Variety of materials available to child for creative activities	.248	-.032	.143	.190	.828	.041	.806
11. Variety of mother's intellectual/ cultural activities and interests	.906	-.050	.016	.197	.251	-.084	.933
12. Variety of father's intellectual/ cultural activities and interests	.902	-.040	.132	.187	-.126	.101	.893
13. Variety of intellectual/cultural activities and interests in home	.466	.572	.137	.170	.448	.091	.800
14. Encouragement given child by mother to engage in intellectual/cultural activities	.098	.852	-.044	.231	-.096	-.167	.828
15. Encouragement given child by father to engage in intellectual/cultural activities	-.042	.798	-.105	-.099	.119	.157	.699
16. Independence allowed child	.226	.309	-.237	-.111	.076	-.696	.705
17. Flexibility in household	-.134	.749	.006	-.046	.090	-.207	.632
20. Degree of free expression allowed child	.243	.401	.402	-.028	.503	.158	.669
21. Degree of acceptance by mother of child's regressive behavior	-.059	-.284	.859	.209	.041	-.110	.879
22. Degree of acceptance by father of child's regressive behavior	.162	.114	.878	.184	-.000	.048	.847
23. Extent of child's creative activities	.070	.139	-.141	.063	.858	-.081	.788
24. Variety of child's intellectual/ cultural activities and interests	-.003	-.026	.109	.750	-.046	.136	.595
V_p	5.594	2.747	1.973	1.791	1.347	1.234	14.687
Prop. contribution to common variance	.294	.145	.104	.094	.071	.065	

Factor IV: Mother's interest in creative activities and variety of child's intellectual-cultural activities. This factor characterizes a home in which the mother herself participates in creative activities, on which she places a high value; she also provides a home rich in opportunities for intellectual and cultural activities.

Factor V: Child's involvement in creative activities in a democratic, culturally oriented home. This factor denotes a home providing the child with a variety of materials for creative activities which the child utilizes in creative pursuits; it is also a home in which the child is permitted free expression and exposed to a variety of intellectual and cultural activities.

Factor VI: Parental encouragement of creative activities by the child in a restrictive home atmosphere. This factor characterizes a home in which both mother and father encourage creative activities by the child but allow him little independence. It suggests the type of home environment in which the child is "pushed" into music lessons, art instruction, or other activities considered desirable by his parents.

In summary, this part of the project is to be regarded as an exploratory study in an area about which relatively little direct information is available. In part, its contribution is to provide tools for investigating those aspects of early home environment conducive to the development of creative behavior. Some of the data corroborate findings obtained in retrospective studies of creative adults and adolescents. But a more important contribution is probably the suggestion of several hypotheses regarding developmental and age-specific features of the child's home environment in relation to ultimate creative achievement.

CHAPTER III

THE CREATIVITY DEVELOPMENT PROGRAM

In the project activities summarized in this chapter, the focus is on development in two distinct senses. First, we are here concerned primarily with procedures for the development and enhancement of creative behavior in children rather than with the identification of conditions associated with existing individual differences in creativity. Second, the approaches followed in these activities fall closer to the development end of the Research and Development continuum than did those reported in Chapters I and II. Most of the latter could be characterized as applied research, with some phases falling within basic research. In the present chapter, the emphasis has shifted to development, supplemented, however, with built-in procedures for evaluating the effectiveness of the educational techniques and products developed.

THE EFFECT OF CREATIVITY TRAINING ON FIFTH-GRADE CHILDREN FROM TWO SOCIOECONOMIC LEVELS

The purpose of this study was to evaluate an instructional program designed to increase creative expression when applied to fifth-grade children from two socioeconomic levels--culturally disadvantaged and middle-class. The training encompassed a variety of media utilizing both verbal and nonverbal content, which would seem to be particularly effective with children from diverse backgrounds. The basic hypothesis of this study was that the training would improve the creative skills of the children and that this improvement would transfer to the test material.

Procedure

Pilot Studies. Prior to the initiation of the major training project,

several pilot studies were conducted in various elementary schools in the Spring and Summer of 1967. The pilot studies were concerned with the selection and development of instruments for use in pretesting and posttesting; and with the development of instructional techniques and the preparation of a preliminary training manual. Still another purpose of such pilot studies was a comparison of two categories of project instructors, namely, creative high school students and project staff, with a view to appropriate assignment of such instructors in the subsequent study. Analysis of gains made by children in the pilot studies indicated no consistent or significant differences in the results obtained with these two types of instructors. The quantitative analyses were supplemented by extensive qualitative analyses based on written reports submitted by each project instructor after each teaching session. All these data suggested that a major factor in the success of the instructional program was the enthusiasm and commitment shared by all project instructors, regardless of age and educational level. It therefore became apparent that positive results might reflect only a "Hawthorne effect," rather than the effect of the specific creativity program under investigation. Accordingly, it was decided to include a second control group in our experimental design, in which children would have the same amount of contact with the identical instructors as did the experimental group, but the sessions would be devoted to other comparable activities not designed to affect creativity.

Subjects. The study began with a total of 173 children from two public elementary schools in the Bronx, New York: P.S. 95, located in a middle-class neighborhood, and P.S. 48, located in a culturally disadvantaged area. Due to various sources of attrition, such as absenteeism and transfers, the number of children who completed the experiment in each school was substantially lower. Some failed to complete the training sessions; others missed one or more of the posttests. The number of children on whom data are available for at least one posttest and who could therefore be included in the data analysis is 129. This

group included 71 pupils (36 boys, 35 girls) from P.S. 95; and 58 pupils (21 boys, 37 girls) from P.S. 48. The ethnic distribution in these two schools is as follows: P.S. 95--67 white, 2 black, 2 Puerto Rican; P.S 48--32 Puerto Rican, 14 black, 14 white. At both schools, non-English-speaking children were excluded from the study.

Training Program. The teachers of the creativity program with the middle-class children were members of the project staff--mostly graduate students in psychology; the disadvantaged children were taught by eight high school senior girls selected because of their own outstanding creative achievement. It will be recalled that the pilot studies had revealed no consistent or significant differences in the results obtained with these two types of instructors. Each teacher in the program was provided with a Teacher's Manual prepared for the study. The Manual contains over 60 suggested exercises for stimulating creative expression. One of the unique features of this program was the variety of media employed, including not only oral and written verbal expression, but also the creative use of visual materials such as paints, paper cutouts, clay and wire sculpture, puppet- and mask-making, and several types of montage. A number of activities were designed to stimulate richness of sense perception for sights, sounds, and touch. Still others utilized ambiguous pictures, inkblots, symbols, incomplete stories, and other stimuli selected to encourage imaginative associations and story telling. Dramatic improvisations and skits were also part of the program. In all these suggested exercises, the major emphasis was on unique and imaginative self-expression. The creative activities were presented to the children in a relaxed, game-like atmosphere, and every effort was made to adapt the activities to the interests and needs of the child.

Criterion Measures. The creativity tests employed in this study comprised two verbal and two figural tasks from the Torrance Tests of Creative Thinking, together with a Similes test and a Creativity Attitude Survey prepared specially

for this study. Only those Torrance tests found to be most reliable and valid in the pilot studies were included. The two verbal tests from the Torrance battery were Asking Questions and Unusual Uses. On the Asking Questions test the child is required to list all the questions he could ask to find out what is happening in a picture; the Unusual Uses test requests the child to think of a number of novel uses for common objects. The two figural tests selected, Picture Completion and Repeated Figures, invite the child to make objects or pictures out of incomplete lines and shapes. Because factorial analyses of Torrance socres in one of the pilot studies had failed to support Torrance's system for multiple scoring of individual tests, only the fluency scale was used to score each of the four Torrance tests.

The Similes test asks the subject to give three different endings for each of ten incomplete simile stems, such as, "The night was as dark as_____." Each ending is scored for originality on a six-point rating scale. The scoring manual for the Similes test was constructed from the test responses of 176 fifth-grade children in the local area. On the Creativity Attitude Survey, the child indicates whether he agrees or disagrees with each of 30 statements related to creativity. The following correlates of creativity are assessed by the Creativity Attitude Survey: confidence in own ideas, appreciation of fantasy, theoretical and esthetic orientation, openness to impulse expression, and desire for novelty. With the exception of the Creativity Attitude Survey, for which no parallel forms were available, alternate forms of the creativity tests were used for the pretest and posttest. All the tests were scored by trained scorers who had no knowledge of the experimental or control status of the subjects.

Experimental Design: The following steps were involved in the experimental design:

(a) Pretest: All groups were given Form A of the Torrance tests, Form A of the Similes test, and the Creativity Attitude Survey.

(b) Instructional Program: 14 one-hour instructional sessions were conducted on alternate weeks during the school year. The participation of the three groups in this instructional program was as follows:

Experimental Group - Creativity training.

Control Group I - These children spent the period with the same instructors as the Experimental Group and worked on the preparation of a class newspaper and on word games. The emphasis in this training was on observation, factual reporting, and logical thinking. This group was included in the study to control for a possible Hawthorne effect.

Control Group II - This group remained in class with their regular teacher and received no special instruction from the project staff.

(c) Posttest: All groups were given Form B of the Torrance tests, Form B of the Similes test, and the Creativity Attitude Survey.

Identical procedures were followed with the children from the two socio-economic levels. The pupils in the three participating fifth-grade classes at each school were assigned to either an Experimental Group or one of two Control Groups (I or II). Within each school, a split-class technique was used with two of the three fifth-grade classes; half of the pupils in the two classes were assigned to the Experimental Group, the remaining half to the Control Group I. The Experimental Group and Control Group I were comparable in terms of sex and grade average. The third class in each school served as Control Group II, taking only pretests and posttests with no intervening contact with the program. Children in the Experimental and Control I groups received the training in small groups of 4 to 5 each. Each instructor in the program taught both an Experimental Group and a Control I group on alternate weeks throughout the school year.

In addition to the statistical analysis of test results, qualitative, subjective evaluations of the effectiveness of the instructional program were obtained systematically from the following three sources: regular classroom teachers, project tutors, and participating children. These evaluations were obtained at the completion of the training sessions through written questionnaires.

Results

The results of this study are summarized in Tables 5 to 8. Tables 5 and 6 contain the means and standard deviations of the test scores obtained by middle-class and by disadvantaged children, respectively, together with *t* ratios of pre- to posttest differences. Table 7 summarizes the results of a covariance analysis of the posttest scores of the three criterion groups within each sample, adjusted for group differences in pretest scores. It will be recalled that the Experimental Group received creativity training, Control Group I received training in logical thinking and factual reporting, and Control Group II received no training. In Table 8 are the individual comparisons of the adjusted posttest scores of these three groups.

In regard to the effectiveness of the creativity training with middle-class children, Table 7 shows significant treatment effects in all tests except Unusual Uses. Reference to Table 8 indicates that the Experimental Group significantly excelled Control Group I on the Creativity Attitude Survey ($p < .01$) and Picture Completion ($p < .05$). The Experimental Group also performed significantly better than Control Group II on the Creativity Attitude Survey ($p < .01$) and Picture Completion ($p < .01$). On the latter group comparison, however, the effect of creativity training is obscured by the Hawthorne effect, since Control Group II received no special attention.

Comparison of Control Groups I and II indicates that Control Group I excelled significantly on the Similes test ($p < .01$) and on Asking Questions ($p < .05$). The superior performance of Control Group I on the verbal tests (Similes and Asking Questions) suggests a possible transfer effect on creative achievement; that is, the verbal experience of preparing a class newspaper and participating in verbal games under the guidance of enthusiastic and supportive adults may have improved the children's verbal creativity. Thus, developing a

Table 5

Pretest and Posttest Data of Middle-Class Children

Test	Group								
	Experimental			Control I			Control II		
	Pre	Post	t	Pre	Post	t	Pre	Post	t
Torrance Figural:									
Pict. Compl.									
Mean	8.19	9.77	4.14***	7.83	8.83	2.08*	8.19	8.56	0.63
SD	2.15	0.75		2.67	1.46		2.18	2.26	
N	31			24			16		
Repeated Figs.									
Mean	13.23	9.07	-3.81***	12.37	10.71	-1.98	6.50	11.00	2.57*
SD	4.57	4.03		5.69	5.79		2.09	7.46	
N	30			24			16		
Torrance Verbal:									
Asking Questions									
Mean	9.79	8.07	-1.97	9.45	9.04	-0.45	11.53	6.33	-3.81*
SD	3.38	3.65		3.66	4.43		4.10	2.84	
N	29			22			15		
Unusual Uses:									
Mean	8.68	13.96	2.67*	6.10	12.48	3.49**	6.46	12.15	3.28*
SD	3.52	9.50		3.42	8.13		3.10	6.27	
N	25			21			13		
Similes									
Mean	42.48	45.26	0.93	47.12	51.33	1.01	35.44	32.87	-0.95
SD	13.01	14.44		13.74	16.17		15.25	13.82	
N	31			24			16		
Creativity Attitude Survey									
Mean	17.26	22.61	7.32***	18.92	20.92	3.52**	17.06	18.81	1.60
SD	3.64	4.27		3.90	4.33		3.86	4.03	
N	31			24			16		

Note.-- A negative sign on the t ratio denotes poorer performance on the posttest.

*p < .05.

**p < .01.

***p < .001.

Table 6

Pretest and Posttest Data of Disadvantaged Children

Test	Group								
	Experimental			Control I			Control II		
	Pre	Post	t	Pre	Post	t	Pre	Post	t
Torrance Figural									
Pict. Compl.:									
Mean	8.00	8.55	1.37	8.05	9.11	2.03	8.30	8.80	0.97
SD	2.17	1.94		1.96	1.59		1.95	1.60	
N	20			18			20		
Repeated Figs.:									
Mean	11.74	12.95	1.00	12.12	13.12	0.50	12.20	9.95	-1.55
SD	5.50	6.15		3.92	7.51		3.74	4.63	
N	19			17			20		
Torrance Verbal									
Asking Questions:									
Mean	5.31	8.06	3.07**	5.00	9.13	3.26**	6.23	7.00	0.75
SD	2.54	4.17		2.22	4.44		2.73	2.54	
N	16			15			17		
Unusual Uses:									
Mean	7.67	18.39	5.53***	7.50	21.87	5.39***	5.94	15.55	2.64
SD	3.79	9.27		2.92	11.02		4.02	13.90	
N	18			16			18		
Similes									
Mean	27.35	33.35	2.01	28.39	31.22	0.86	30.55	30.60	0.02
SD	14.44	17.75		13.08	16.51		12.60	9.22	
N	20			18			20		
Creativity Attitude Survey									***
Mean	14.50	16.80	3.06**	14.45	17.06	3.35**	15.00	17.30	4.35
SD	2.27	3.96		1.95	2.20		2.81	3.18	
N	20			18			20		

Note.--A negative sign on the t ratio denotes poorer performance on the posttest.

*p < .05.

**p < .01.

***p < .001.

Table 7

One-Way Analysis of Covariance of Posttest Scores

of Three Criterion Groups

Test	Middle Class Children			Disadvantaged Children		
	df	MS	F	df	MS	F
Picture Completion						
Treatment	2	9.25	4.89**	2	1.47	0.55
Error	67	1.88		54	2.64	
Repeated Figures						
Treatment	2	114.22	4.17**	2	65.01	1.72
Error	66	27.38		52	37.65	
Asking Questions						
Treatment	2	43.22	3.14*	2	23.83	1.59
Error	61	13.76		44	14.98	
Unusual Uses						
Treatment	2	3.44	0.04	2	127.64	0.88
Error	55	73.10		47	144.12	
Similes						
Treatment	2	914.55	4.38**	2	117.20	0.76
Error	67	208.94		53	152.70	
Creativity Attitude Survey						
Treatment	2	483.50	38.54***	2	0.41	0.04
Error	67	12.54		54	8.61	

*$p < .05$.
**$p < .01$.
***$p < .001$.

Table 8

Group Comparisons of Adjusted Posttest

Scores by Tukey (a) Test

Test	Experimental vs. Control I	Experimental vs. Control II	Control I vs. Control II
		Middle-Class Children	
Picture Completion	*	**	NS
Repeated Figures	NS	NS	NS
Asking Questions	NS	NS	*
Unusual Uses	NS	NS	NS
Similes	NS	NS	**
Creativity Attitude Survey	**	**	NS
		Disadvantaged Children	
Picture Completion	NS	NS	NS
Repeated Figures	NS	NS	NS
Asking Questions	NS	NS	NS
Unusual Uses	NS	NS	NS
Similes	NS	NS	NS
Creativity Attitude Survey	NS	NS	NS

NS = not significant
*$p < .05$.
**$p < .01$.

child's ability to understand and manipulate raw materials, such as verbal content, may facilitate his subsequent use of these materials in creative ways.

The covariance analysis with the disadvantaged children (Table 7) reveals no significant differences between the gain scores of the three groups, a finding that is corroborated by the absence of significant group differences in Table 8. Although no effect of the creativity training could be demonstrated with the disadvantaged subjects, substantial pre-posttest differences were apparent between the two major groups, i.e., middle-class and disadvantaged (Tables 5 and 6). More specifically, inspection of pretest scores for the comparable groups of middle-class and disadvantaged children reveals that the mean scores of the middle-class groups surpassed those of the disadvantaged groups on 14 of the 18 comparisons. Analysis of the posttest data, however, reveals that in half of the 18 comparisons the mean scores of the disadvantaged groups exceeded those of the comparable middle-class groups. Particularly noteworthy is the Unusual Uses test where posttest differences favored the disadvantaged children by substantial amounts.

In summary, the test results indicate that, while the creativity training had limited success with the middle-class children, it yielded no significant effect on children from culturally disadvantaged backgrounds. The results with the middle-class children indicated that the creativity training proved especially effective in changing the children's attitudes toward creativity. In particular, on the Creativity Attitude Survey these children reported greater confidence in expressing themselves in a variety of media, as well as a greater appreciation of fantasy and impulse expression. Staff observations on the behavior of the children over the course of the training program supported this finding. For instance, the experimental subjects displayed a marked decrease in copying behavior, an increased enthusiasm for creative self-expression, and a

greater willingness to express fantastic images and personal feelings. In other words, creativity training appears to break up rigid modes of reacting so as to leave the individual more receptive to creative expression.

Moreover, the findings with the middle-class children indicated that training in the more traditional skills of logical thinking and accurate reporting, as in Control Group I, can improve the performance of children on verbal tests of creativity, such as Asking Questions and Similes. This finding reflects the growing awareness that creative thinking encompasses a wide variety of thought processes, both convergent and divergent in nature. The ideal curriculum, then, will ensure that both modes of thinking are cultivated.

As for the results with the disadvantaged children, the most obvious explanation for the lack of significant effects of the training program is that all three groups showed marked gains on posttests. So substantial were these gains that comparisons of posttest means for comparable middle-class and disadvantaged groups reveal that the disadvantaged groups excelled the middle-class groups in half of the 18 comparisons. Part of the gains can be attributed to overcoming the "strangeness effect that children experience in taking an unfamiliar test. This effect, which has been found by other investigators with disadvantaged children, may well have masked the effect of the creativity training. It is also conceivable that the disadvantaged children had an initial advantage on certain aspects of the creativity tasks, since they tend to have an open, uninhibited approach to life and a free-wheeling response style. Thus they would have profited less than the middle-class children from the "disinhibiting" effects of the creativity training. In this connection it is noteworthy that on the nonverbal pretests the disadvantaged children did about as well as the middle-class children or better. Their poorer performance on the verbal pretests may have resulted from the strangeness and unfamiliarity of the

tasks and from their deficient verbal skills. Caution should be used, however, in interpreting the results with the disadvantaged children, since a high rate of attrition occurred in their Experimental Group over the course of the study. As a result, the final group of disadvantaged subjects was severely limited both in regard to size and representativeness. Further research is obviously needed to explore the implications of this study.

Follow-Up Study

In an effort to assess the durability of the effects of the creativity training program, a follow-up study was undertaken with the pupils who had participated in the training project at P.S. 95 (middle-class group). Of the 71 fifth-grade children who had completed the initial experiment, 49 were located for the follow-up. Comprising 24 boys and 25 girls, this group was distributed as follows in the original experimental design: 24 Experimental, 16 Control I, and 9 Control II. Twenty months after the posttest, these children were retested with the Creativity Attitude Survey and the first form of Unusual Uses and Picture Completion. At the time of the follow-up, the children were enrolled in the seventh grade of two Bronx junior high schools located in the same school district as P.S. 95.

When the follow-up scores were submitted to an analysis of covariance, with pretest scores as the covariate, significant treatment effects were found for the Creativity Attitude Survey but not for the other two tests. In the Creativity Attitude Survey the Experimental Group, which had received creativity training, retained its advantage over both control groups. The two control groups did not differ significantly from each other in any of the instruments at this time. Despite the meager data on which it is based, this follow-up thus corroborates the original finding that the major effect of the creativity training pertains

to the subjects' attitudes toward creative expression. Such a conclusion is also in line with the results of other creativity research. The present follow-up suggests that these attitude changes are also relatively resistant to extinction over time.

CREATIVITY TRAINING PROGRAM FOR IN-SERVICE TEACHERS

The creativity training program developed and evaluated in the previously reported study was designed for eventual use by teachers in their own classes. Accordingly, the next step was to conduct a series of in-service seminars and workshops for teachers and to assess the effects of this experience on both the teachers themselves and the children in their classes. The goal of this program was twofold: (1) to encourage the participating teachers to develop their own powers of creative thinking and self-expression, and (2) to assist the teachers in implementing creative thinking skills in the classroom.

Subjects

The direct participants in this training program were 27 fourth- and fifth-grade teachers (23 women and 4 men) from four public elementary schools in greater New York. Two of the schools (P.S. 35 and P.S. 176) are located in a middle-class neighborhood in Queens, the other two (P.S. 36 and P.S. 100) in a disadvantaged area of the Bronx.

The indirect participants in this project were the 687 children taught by these teachers, with whom the teachers utilized the materials, techniques, and general orientation developed in the workshops. In each of the four schools, approximately 67 percent of the total enrollment was black or Puerto Rican. Distribution of subjects by school, grade, and sex is given in Table 9.

Teacher Training Program

The seminars and workshops were conducted by four members of the project staff, each handling certain topics within the total course. The program

Table 9

Distribution of Subjects Participating in Creativity Training Study

Subject Category	Experimental			Control		
	P.S. 100 (Bronx- Low SES)	P.S. 176 (Queens - Middle SES)	Total	P.S. 35 (Queens - Middle SES)	P.S. 36 (Bronx - Low SES)	Total
4th Grade:						
Boys	51	23	74	27	58	85
Girls	56	36	92	54	61	115
Total	107	59	166	81	119	200
5th Grade:						
Boys	27	39	66	30	39	69
Girls	49	40	89	50	47	97
Total	76	79	155	80	86	166
Grand Total	183	138	321	161	205	366
Teachers	7	6	13	6	8	14

included 27 one-hour weekly sessions extending from October 1969 to May 1970. The sessions were held after school on school premises, and the teachers were paid a $10 fee for participating in each session. In addition, each teacher devoted at least one hour a week to creativity training in her classroom, using the previously developed creativity training manual as a source for specific exercises.

The individual sessions in the teacher training program usually consisted of short lectures followed by workshops in which the teachers actively engaged in a number of creative activities. Among the topics covered were creative

problem-solving (brainstorming, attribute listing, and Synectics), Sensory awareness (tastes, sounds, touch), role-playing, myths, poetry writing, and attitudes toward creativity. Approximately one-third of the sessions were recorded on audiotapes, which are available for future research or training purposes. (See list in Ch. IV.)

Program Evaluation

To assess the effectiveness of the program, four independent procedures were followed: (1) pre- and posttesting of children; (2) pre- and posttesting of teachers; (3) classroom observations by project staff; (4) qualitative evaluation of program by participating teachers.

The experimental design involved a comparison of performance change in the two experimental and the two control schools. Each pair of schools included one middle-class and one disadvantaged school, as indicated in Table 9. Experimental and control schools were comparable in terms of pupil academic achievement, ethnic distribution, average class size, total enrollment, and socioeconomic level of the community. In addition, the 13 experimental and 14 control teachers were comparable in number of years of teaching experience, which averaged slightly under nine years in both groups. The teachers in the experimental group participated in the creativity sessions; those in the control schools had no contact with the project staff except during pre- and posttesting. Staff contacts with the children in all four schools were also limited to pre- and posttesting sessions.

The same pre- and posttesting creativity battery was administered to teachers and pupils in the experimental and control schools in October and May. This battery included the Creativity Attitude Survey and the Similes test developed in earlier parts of this project, as well as one verbal and one figural test from the Torrance creativity tests (Unusual Uses and Repeated

Figures). Except for the Creativity Attitude Survey, parallel forms of the instruments were administered during pre- and posttesting.

Classroom observations were conducted by three members of the project staff in all experimental and control classes at the middle of the school year (January) and again at the end of the year (May). A seven-point rating scale was employed for these observations, supplemented by specific instances illustrating the extremes of each trait. Two traits were evaluated for teacher behavior: Autocratic-Democratic and Stereotyped-Original. For pupil behavior, three traits were rated: Apathetic-Alert, Obstructive-Responsible, and Stereotyped-Original. These traits were selected from double the number on the basis of preliminary investigation of rater reliability, in which two raters had simultaneously observed in the same classrooms.

The thirteen teachers in the experimental group were asked to submit an evaluation of the program on specially prepared forms. First, an over-all assessment of the program was to be recorded by checking "Very Worthwhile," "Moderately Worthwhile," or "Hardly Worthwhile," and appending reasons for this judgment. The teacher was then asked about ways in which the program helped her as an individual; any changes effected in her working with children in the classroom; changes observed in the children both in creativity sessions and in other subject areas; and suggestions about improving the program. On another form, the teacher was asked to give her over-all evaluation of the training manaul together with specific comments.

Results

Creativity Battery: Children. Table 10 summarizes the results obtained in the comparison of pretest and posttest scores of experimental and control groups on the four tests of the creativity battery. A significant treatment effect in favor of the experimental groups was found for three of the tests,

namely, Unusual Uses, Repeated Figures, and Creativity Attitude Survey. Since none of the interactions was significant, the treatment effect was consistent in direction and amount for boys and girls and for fourth- and fifth-grade pupils. Although the Similes test showed no significant treatment effect, the fifth-grade pupils scored significantly higher than the fourth-grade pupils (significant grade effect in Table 10). The appreciable contribution of verbal ability and specific word knowledge to this test probably accounts for the marked improvement of scores with grade level.

The principal conclusion from these findings is clearly that the in-service teacher seminars conducted in this part of the project proved effective in improving the children's attitudes toward creative expression and in augmenting their creative thinking on tests employing both verbal and figural content. The over-all demonstration of significant effect of the experimental "treatment reported in Table 10 is further illustrated by inspection of results in individual subgroups classified with respect to sex, grade, and school. When pretest and posttest scores of the 8 experimental subgroups were compared on each of the four tests, statistically significant improvement was found in 25 of the 32 comparisons and no significant change was found in the remaining 7. In the 8 control subgroups, on the other hand, whose teachers had not participated in the in-service training, 16 comparisons yielded a significant pretest-posttest improvement, 14 no significant change, and 2 a significant loss.

Creativity Battery: Teachers. Since the principal purpose of the teachers' in-service training was to improve their effectiveness in stimulating the creative development of the children in their classes, the previously reported effects of the program on the children's performance are of primary concern. It is nevertheless of some interest to observe any effects of the training on the teachers' own performance on the creativity battery. The identical tests were

Table 10

Analysis of Variance of Children's Pretest-Posttest Differences on Creativity Tests with Sex, Grade, and Treatment as the Main Effects

Source	df	MS	F
	Unusual Uses Test		
A (Sex)	1	1.51	2.36
B (Grade)	1	0.39	0.61
C (Treatment)	1	39.02	61.03**
AB	1	0.23	0.35
AC	1	2.62	4.10
BC	1	1.19	1.86
ABC	1	0.12	0.19
Error	634	0.64	
	Repeated Figures		
A (Sex)	1	1.27	2.49
B (Grade)	1	1.13	2.22
C (Treatment)	1	17.80	34.97**
AB	1	0.08	0.16
AC	1	1.70	3.35
BC	1	3.02	5.93
ABC	1	1.12	2.20
Error	643	0.51	
	Similes		
A (Sex)	1	2.72	1.48
B (Grade)	1	13.44	7.31**
C (Treatment)	1	0.52	0.28
AB	1	0.09	0.05
AC	1	5.06	2.75
BC	1	0.93	0.50
ABC	1	0.01	0.01
Error	627	1.84	
	Creativity Attitude Survey		
A (Sex)	1	0.00	0.01
B (Grade)	1	0.00	0.01
C (Treatment)	1	5.87	25.68**
AB	1	0.04	0.16
AC	1	0.11	0.49
BC	1	0.34	1.48
ABC	1	1.21	5.27
Error	646	0.23	

**$p < .01$.

administered to teachers and pupils at the same time by the project staff. The results obtained with the teachers are limited by the use of tests which were designed for elementary school children and, with the possible exception of the Similes test, are unsuitable for relatively sophisticated adults. Thus improvement from pretest to posttest would be severely restricted by a ceiling effect in the scores. This limitation is borne out by the finding that the mean scores obtained by the teachers were much higher than those obtained by the children on all four tests and approached the maximum score on the Creativity Attitude Survey. A further limitation in finding significant improvement in average scores stems from the small number of teachers involved. Due to various sources of attrition (absenteeism, transfers, unwillingness to take tests), pretest and posttest results were available for only 12 experimental teachers and for 10 or 8 control teachers (depending on the test).

In Table 11 will be found means and standard deviations of the experimental and control teachers on pretests and posttests, together with the F ratios resulting from a covariance analysis of these scores. Although the experimental groups showed consistently more improvement than the controls on each of the four tests, the covariance analysis yielded only one significant difference in favor of the experimental group, on the Unusual Uses test. Thus on this test the advantage of the trained teachers over the control teachers was large enough to emerge despite the two limitations discussed above. Since a major emphasis in the in-service training program was on creative problem-solving techniques, it is not surprising that the experimental group manifested their highest gain on the problem-solving test.

Classroom Observation. The results of the initial and final classroom observations conducted by the project staff in experimental and control classes

are given in Table 12. It will be noted that the initial ratings of both teacher and pupil behavior showed no significant differences between experi-

Table 11

Pretest and Posttest Creativity Test Scores of Teachers

Test	Experimental		Control		Covariance Analysis
	Pretest	Posttest	Pretest	Posttest	F ratio
Unusual Uses:					
M	24.25	31.66	19.70	18.50	7.27**
SD	12.47	10.40	8.11	11.22	
N	12		10		
Repeated Figures:					
M	16.83	21.50	18.00	18.62	0.47
SD	5.35	6.65	6.71	10.19	
N	12		8		
Similes:					
M	68.25	72.75	61.70	64.59	0.46
SD	14.24	12.11	16.70	19.68	
N	12		10		
Creativity Attitude Survey:					
M	26.25	27.75	27.00	27.75	0.12
SD	2.22	1.05	2.00	1.58	
N	12		8		

**$p < .01$.

mental and control classes. On the final ratings, on the other hand, the experimental classes significantly excelled the control classes on both teacher behavior scales and on two of the three pupil behavior scales. The only exception was the Obstructive-Responsible scale, in which the experimental-control difference failed to reach statistical significance in the final observations. Even in this case, however, the results were in the expected direction, the experimental group having gained from initial to final observations while the control group dropped slightly in mean score.

Table 12

Comparison of Observational Ratings of Experimental and Control Classrooms

Scale[a]	N	Group	M	SD	t
Initial Observation					
Teacher Behavior					
Autocratic-Democratic	13	Exper.	4.65	1.44	
	14	Contr.	4.00	1.16	1.21
Stereotyped-Original	13	Exper.	4.73	1.21	
	14	Contr.	4.00	1.19	1.49
Pupil Behavior					
Apathetic-Alert	13	Exper.	4.34	1.23	
	14	Contr.	4.26	1.08	0.17
Obstructive-Responsible	13	Exper.	4.26	1.08	
	14	Contr.	4.38	1.27	-0.25
Stereotyped-Original	13	Exper.	4.42	1.08	
	14	Contr.	3.88	1.11	1.20
Final Observation					
Teacher Behavior					
Autocratic-Democratic	13	Exper.	5.69	0.91	
	14	Contr.	3.64	1.39	4.34**
Stereotyped-Original	13	Exper.	6.00	0.55	
	14	Contr.	3.64	1.63	4.80**
Pupil Behavior					
Apathetic-Alert	13	Exper.	5.76	1.25	
	14	Contr.	4.42	0.90	3.11**
Obstructive-Responsible	13	Exper.	5.30	1.77	
	14	Contr.	4.00	1.60	1.95
Stereotyped-Original	13	Exper.	5.30	0.82	
	14	Contr.	3.42	1.40	4.07**

[a]Higher score indicates greater incidence of favorable behavior, e.g., original behavior versus stereotyped behavior.

**$p < .01$.

Insofar as can be determined by these classroom observations, therefore, the effect of the in-service training program was that the teachers showed a more democratic and original approach to their teaching and the children exhibited more alert and original behavior in the classroom.

Qualitative Evaluation by Teachers. On separate forms, the 13 "experimental" teachers were invited to evaluate both the training manual and the in-service training course. Without exception, the teachers' evaluations of the training manual were most enthusiastic. They repeatedly characterized it as an "excellent" and "valuable" reference book for stimulating creative expression in children of various grade and ability levels. They also reported that the children were most receptive to the types of activity suggested in the manual and responded in an "unconventional" manner to the ideas presented to them. The following are two illustrative comments submitted by teachers from schools in a middle-class and a culturally disadvantaged neighborhood, respectively:

> "I found the Sourcebook very valuable--full of ideas that could be used with little preparation--wonderful to have at hand all the time. I have shared it with both student teachers and regular classroom teachers. They also found it very valuable."
>
> Mrs. C., 5th-grade teacher
> P. S. 176, Queens

> "I found this sourcebook to contain an excellent fund of ideas for creative thinking in all areas. The instructions were clear if you wished to follow them as such--but they also helped trigger off other ideas. It is a treasure I shall always use."
>
> Mrs. L., 4th-grade teacher
> P. S. 100, Bronx

Other evaluation forms called for an over-all assessment of the in-service training course, as well as answers to specific questions about it. Of the 13 teachers participating, 11 rated the course as "Very Worthwhile" and 2 as "Moderately Worthwhile"; none chose the third available response, "Hardly Worthwhile." In giving reasons for their evaluation, most teachers reported that they are now more accepting of the children's ideas and viewpoints, criticize less,

and are now more relaxed in the classroom. They also reported that the children, by the end of the training program, were freer in both oral and written expression, were more able to produce diverse solutions to problems, were more open to their feelings, and became more accepting of the ideas of others. In many cases, teachers reported improvement in other curriculum areas, most often in Social Studies and Language Arts, but even in Mathematics.

The teachers reported that they would change little in the way of course structure, content, or instructional techniques. They did, however, suggest that a workshop format be substituted for the early lectures on problem solving. They felt that workshops and group discussions are more stimulating to teachers at the end of a long day. Several teachers also suggested scheduling more time for discussions of classroom experiences in teaching for creative endeavor.

The chief benefits of the course sessions reported by the teachers were:

1. An increase in fresh ideas and approaches in teaching for creative endeavor and better understanding of creative thinking processes;

2. Increased appreciation and recognition of unusual ideas by the children;

3. Greater inspiration, excitement, and confidence in teaching creative expression.

The major difficulties encountered by the teachers in implementing the principles of this course were as follows:

1. Insufficient time in school week for innovation and experimentation;

2. Children's emotional blocks to creativity (e.g., fear of failure and ridicule);

3. Increased freedom leading to increased behavior problems;

4. Feeling uncomfortable in unstructured situations;

5. Difficulty in setting a favorable classroom atmosphere for creativity.

The following excerpts from the replies to each question on the evaluation form illustrate the teachers' reactions to the program.

Question 1 - Over-all Evaluation of the Program

"In the past, creativity had always been mentioned as a part of the overall curriculum but the techniques and skills needed for the development of this were not available to the teacher. The in-service program of Creativity more than fulfilled this need. The presentation of specific methods of initiating 'infrequent responses' finally supplied the tools. Emphasis in schools had always been associated with compositions, poems, and some art activities, but little or no thought had been given to the mental processes which are a definite part of Creativity. . . . This course gave teachers an opportunity to learn how to revise and reevaluate their own approach toward appreciating and motivating the creative talents of children."

Mrs. C., 4th-grade teacher,
P.S. 176, Queens

Question 2 - In what ways (if any) do you feel the Creativity Project has helped you as an individual? (apart from the classroom)

"It has helped me find more ways to do things and to find more than one answer to a problem. The best thing or the most important thing that I have learned is not to prejudge ideas, to be able to suspend judgment for a time."

Mr. A., 5th-grade teacher
P.S. 100, Bronx

Question 3 - In what ways (if any) has the Creativity Project brought any change in your working with the children in the classroom?

"It has forced me to listen more to ideas I think I would previously have rejected and as a result to enjoy their individuality more. It gave a sense of acceptability and warmth in my classroom which was generally pretty structured."

Miss S., 5th-grade teacher
P. S. 100, Bronx

Question 4 - Have you noticed any changes in the children that may be related to the program:

(a) In creativity sessions:

"My children are more spontaneous in their approach to problem solving and brainstorming. Their attitude towards one another and toward final products is more generous and yet more discriminating."

Mrs. G., 4th-grade teacher
P.S. 100, Bronx

(b) In other subject areas:

"The creativity training has affected their ability to relate better to other people and customs in social studies.

'They see that even if the answer in math or reading comprehension is 'technically wrong' it might be 'possible.' We can discuss possibilities now--they are not so bound or confined to the RIGHT answer. We definitely have more fun now in all our curriculum areas. We can relate better to each other and feel freer to express our feelings--not only our ideas."

Miss M., 5th-grade teacher
P. S. 176, Queens

Conclusions

The principal finding of this study is that teachers who are provided with special materials and training can raise the creativity level of their children higher than can teachers who are not offered this assistance. This conclusion is supported by evidence from three sources: classroom observations, creativity tests, and teacher evaluations. Observer ratings of classroom behaviors revealed that the trained teachers surpassed the control teachers in exhibiting a more democratic and original teaching style, and the children in their classes showed more alert and original behavior in the classroom. The experimental teachers and children also produced higher gains on creativity tests--most noticeably the Unusual Uses test, a creative problem solving task which employs verbal content. This gain on the Unusual Uses test may be related to the fact that a major emphasis in the creativity training program was on creative problem-solving techniques. This was a completely new area for both the teachers and children, and they responded with interest and enthusiasm to the new challenge.

The creativity program in this study had two main components: curriculum materials and an in-service training course. The superior performance of the experimental children seemed to result from a combination of the two factors. The subjective evaluations of the trained teachers attest to this conclusion. All the teachers were most enthusiastic about the training manual or "ideabook,"

which they considered an excellent compendium of curriculum ideas suitable for use by both beginning and experienced teachers. The experimental teachers also reported that the in-service course was worthwhile in that it offered them the support and encouragement they needed to implement new ideas. Several teachers also commented that the program helped them grow as persons in that they felt a greater innovative set and adventurous spirit. They also noted that their children were less inhibited and comforming in the classroom and more open to expressing their personal feelings and images.

It seems reasonable to conclude, therefore, that pre- and in-service teacher education programs should try to incorporate the major goals of the present program, namely: (1) fostering the creative potential of teachers by providing them with opportunities to engage in creative thinking and self-expression; (2) examining research evidence as to the nature and nurture of creativity; and (3) encouraging teachers to seek to apply research findings and the results of their studies to actual classroom situations.

Another implication of this study is that creativity training programs should not be limited to middle class or gifted children. Every child has some creative ability which can and should be developed. In the present study, a creativity training program was found to be successful with black and Puerto Rican children from varying ability and socioeconomic levels. It will be recalled that in the training study summarized earlier in this chapter, the mean scores of disadvantaged groups of children on the posttest creativity battery exceeded those of comparable middle-class groups in half of the 18 comparisons.

The significant results of the present study give direction to additional research in the area. Further research should be conducted to determine whether the gains found in the experimental groups persist over an extended period. In this connection, the follow-up study reported earlier in this chapter revealed

that the significant improvement shown by a group of trained middle-class children on the Creativity Attitude Survey did not diminish over a 20-month period. Since, in the year ahead, the fourth-grade experimental children in the present study will be exposed to a number of fifth-grade teachers trained by the present program, there is every reason to believe that the gains recorded by this group in creative behavior will continue and perhaps expand over this period. The long-term effect of the present program on the teaching style of the experimental teachers might also be investigated.

POETRY SEARCH

Much of what is reported in this chapter may be regarded as an implementation of research findings cited in Chapters I and II. It will be recalled that one of the most clearly differentiated characteristics of the creative adolescents investigated in the Biographical Inventory studies was early recognition and reinforcement for their creative works in the form of exhibits, publication, prizes, or awards. In the expectation, therefore, that such recognition serves as a stimulant to creative expression, an annual Poetry Search was initiated among school children in the New York metropolitan area. The specific objectives of the Search were: (1) to give added encouragement to children to speak out in their own unique way; (2) to highlight the quality of children's poetry; and (3) to provide children with examples of outstanding poetry written by their peers.

In January 1969 announcements of the Poetry Search were mailed to principals of all public, private, and parochial elementary schools in Greater New York and Westchester county, inviting the submission of poems written by any fourth-, fifth-, or sixth-grade child. The response was most gratifying; over 21,000 poems were received from 550 schools. Each poem was read by at least two members of a screening panel, consisting chiefly of project staff and graduate students

in psychology. The selections of this panel were then submitted to three final judges (poets, writers, and teachers of writing) who chose a group of poems to be included in the first Poetry Search Anthology. This 30-page anthology was distributed to all the participating schools and other interested persons.

The 1969 Poetry Search Anthology aroused widespread interest. Among the offshoots of this Poetry Search are the following:

1. The Anthology will be published early in 1971 by the Bruce Publishing Co., New York, under the title YOUNG VOICES.
2. The Poetry Search was featured in an article in THE NEW YORK TIMES of Thursday, September 4, 1969, as well as in the INTERNATIONAL HERALD TRIBUNE of September 10, 1969.
3. Ten of the poems from the Anthology were incorporated in an article in the March 1970 edition of WOMAN'S DAY magazine.
4. The Miles Laboratory exhibit at Expo 70 in Japan is a word-and-image presentation entitled "JOY" which is based on 14 poems from the 1969 Poetry Search.
5. Radio interviews concerning the children and their poetry were taped with Gary Moore (Voice of America), Lee Graham (WNYC and Voice of America), and Bridget Paolucci (Canadian Broadcasting Corporation).

During the 1969-70 academic year, a second Poetry Search was conducted by similar procedures. The geographical area was again greater New York and Westchester County; but the grade coverage was expanded to include all levels from kindergarten to Grade 6. Over 15,000 entries were received and processed, as in the 1969 Search, by a screening panel and a group of final judges.

CHAPTER IV

ASSESSMENT AND TRAINING MATERIALS

The "Development" aspect of this project has included, not only the demonstration and evaluation of training programs, as discussed in Chapter III, but also the preparation of certain products suitable for more general distribution and use. To date, these products include: (1) the Similes test and scoring manual; (2) the Creativity Attitude Survey and scoring manual; and (3) the creativity training manual and related teacher-training audiotapes.

THE SIMILES TEST

General Description

The ability to form original metaphors and similes has long been considered a characteristic of literary talent, particularly for the poet. Essentially, this skill requires the perception of similarity among diverse and apparently dissimilar objects or qualities. In connection with the investigations at the elementary school level summarized in Chapters I and II, a Similes test was developed in which the subject is asked to write three different completions for each of 10 incomplete similes. The items appeal to a variety of senses and emotions. Half of the simile stems in each form end in the conjunction "as" and half in the conjunction "like." Two examples are given below:

The young girl was as playful as _____.

The water felt cold, like _____.

The instructions urge the subject to make the endings as imaginative as possible and to try to think of fresh new endings that no one has used before. Total time allowed for the 30 responses is 15 minutes. The test is available in two parallel forms (Similes I and Similes II).

Scoring

The test is scored for originality, defined to include both novel and adaptive aspects. Each of the responses is assigned an originality rating on a scale ranging from 0 to 5. A detailed scoring manual has been prepared for each form, giving a description of the 6-point originality rating scale and examples of responses assigned each scoring weight. These scoring examples were selected from the responses of 176 fifth-grade pupils (78 boys and 98 girls) attending two public schools in New York City. One school was located in a middle-class area, the other in a disadvantaged neighborhood.

The frequencies of responses in the same sample were used in arriving at scoring weights, in which both the rarity or novelty and the aptness of the response are considered. Scoring weights at each end of the 6-point originality scales (i.e., 0,1 and 4,5) were assigned to relatively infrequent responses. An infrequent response was given a high or low weight depending upon its aptness or meaningfulness. Infrequent responses that appeared to be bizarre, haphazard, or obscure were assigned lowest weights (0 and 1), while unusual responses that appeared to be particularly clever or apt received the highest weight (4 or 5). Scoring weights at the middle of the scale (2 and 3) were given to meaningful responses that occurred repeatedly in the sample. More specifically, weights of 2 were assigned to responses with frequencies at or above 3%, while less common responses (1% - 2.99%) were given a weight of 3.

An individual's total score on the Similes test is the sum of the scoring weights assigned to each response. The possible range of scores on the test is thus 0 to 150.

Normative Data

Preliminary normative data have been collected from elementary school, high school, and college samples. Table 13 gives means and SD's for 10 normative

samples. Since the means for boys and girls at the elementary school level were nearly identical, the data for the two sexes were combined at this age period. Inspection of Table 13 reveals that scores on the Similes test tend to improve

Table 13

Means and Standard Deviations of Similes Test for Normative Groups

Group	Description	Similes I				Similes II			
		N	M	SD	Range	N	M	SD	Range
1	Fourth-grade middle class	80	23.91	11.60	2-51				
2	Fifth-grade middle class	70	41.54	14.04	10-76	70	44.89	16.59	11-79
3	Fifth-grade disadvantaged	57	28.51	13.55	0-59	57	31.42	14.85	7-79
4	Fifth-grade upper-middle class	65	47.83	12.59	11-74	65	47.92	13.98	13-76
5	Fifth-grade middle class	130	32.21	12.61	2-95				
6	Sixth-grade middle class	129	37.39	12.83	7-92				
7	High School Fresh. males[a]	54	59.46	16.22	15-97				
8	High School Soph. males[a]	46	59.39	14.00	28-91				
9	College males	56	54.57	15.79	22-94	56	59.66	16.28	21-104
10	College females	33	49.64	13.33	26-78	33	59.58	16.84	22-89

[a]enrolled in an honors program

with age through elementary school and then level off in high school and college. Even at the college level, however, the highest score actually obtained (104) did not approach the highest score possible (150). Thus, this test appears to have a very high ceiling.

Tentative percentile norms are available for groups 5, 6, 7, and 8 in Table 13, representing middle-class fifth- and sixth-grade samples and intellectually superior ninth- and tenth-grade boys.

Reliability

Scorer reliability coefficients for the two forms of the Similes test ranged from .93 to .98. Odd-even reliability ranged from .84 to .89 in elementary school samples and from .82 to .87 in high school samples. To obtain additional estimates of internal consistency, correlations between individual test items and total score were computed with the data of the college sample. For each of the two forms, every item was found to be significantly correlated ($p < .01$) with the total score. The median correlation for Similes I was .50 (range .29 to .61) and for Similes II it was .56 (range .41 to .64). A retest reliability of .60 was found by administering Forms I and II with a two-week interval to a group of 65 upper-middle-class fifth-grade children.

Validity

Preliminary data on the validity of the Similes test have been gathered through correlations with other creativity tests as well as with a teacher-nomination criterion.

At the elementary school level, the Similes test scores of 47 middle-class fifth-grade children were correlated with scores on five tests from the Torrance battery (three verbal and two nonverbal) and with the Similes Preference Inventory prepared by Pearson and Maddi.[1] Designed to measure the subject's preference for variety or novelty, the latter test consists of 54 similes, each with five alternative endings. The subject is required to indicate which of the five endings he prefers for each simile stem. The Similes test yielded significant correlations with the three verbal tests from the Torrance battery, the

[1]Pearson, P. H., & Maddi, S. R. The Similes Preference Inventory: Development of a structured measure of the tendency toward variety. Journal of Consulting Psychology, 1966, 30, 301-308.

correlations ranging from .32 to .58. It showed only negligible correlations, however, with the two nonverbal tests and with the Similes Preference Inventory. Thus the Similes test appears to be related principally to the ability for creative production in the verbal medium.

Reference has already been made in the preceding section of this chapter to the correlation of .31 ($p < .05$) found in a sample of college women between the Similes test and the Creative Writing Scale of the Biographical Inventory for Creative Adolescents.

Two elementary school samples provided data of validity against a teacher-nomination criterion. First, for a sample of upper middle-class fifth-grade children, teachers were asked to submit the names of children who had revealed concrete evidence of creative work in the classroom; the same teachers were asked to identify children who had produced no observable evidence of creativity, but were comparable to the creative nominees in academic achievement. By including only children nominated by two or more teachers, a total of 10 creatives and 10 controls was obtained. On the Similes test the creative group obtained a significantly higher mean than the control ($p < .05$).

In the second study, all the fifth- and sixth-grade teachers at three large public schools in the Bronx, New York, were asked to nominate both creative and control students following the same procedure described in the above study. A total of 40 creative and 111 control nominees were named. The mean of the creative group on the Similes test again excelled that of the controls, this time at the .01 level of significance. It is interesting to note that two Torrance tests (one verbal and one nonverbal), administered in the same study, failed to differentiate significantly between the two groups.

In summary, preliminary results with the Similes test indicate satisfactory scorer and test reliability, promising validity, and applicability over a wide age and educational range.

CREATIVITY ATTITUDE SURVEY

General Description

Designed specifically for children in grades 4 through 6, the Creativity Attitude Survey (CAS) consists of 32 statements, for each of which the child is to indicate his agreement or disagreement. Item construction of the CAS was based upon a review of the literature for the characteristic attitudes, beliefs, and values of highly creative persons. Two of the 32 statements in the CAS (Items 3 and 14) are filler items designed to reduce the visibility of the instrument. The remaining 30 items were included to measure the following dimensions associated with creative achievement:

Confidence in own ideas (11 items)
Appreciation of fantasy (7 items)
Theoretical and aesthetic orientation (5 items)
Openness to impulse expression (4 items)
Desire for novelty (3 items)

Scoring

Each of the 30 statements relevant to creativity is scored 1 or 0 depending on whether or not the response is judged to be favorable to creativity. Thus, the possible range of scores is from 0 to 30, the higher scores indicating a more favorable attitude toward creativity. Incomplete or multiple responses to an item are scored 0. In order to control for acquiescence response set, 15 statements were so worded that an affirmative answer was scored in the creative direction and 15 were so worded that a negative answer was so scored.

As a check on the discriminative power of individual items, the percentage of a fifth-grade group (N = 67) choosing the keyed response to each of the 30 scored items was found. These percentages range from 36 to 97. For more than half of the items (18), the percentages fell between 40 and 80. It should be noted that this sample consisted of upper middle-class children with superior IQ's, who obtained the highest mean score of all normative samples thus far

tested with the CAS. Hence in a more nearly random sample, the frequency of keyed responses would undoubtedly be lower. It thus appears that the items provide satisfactory discrimination among individuals, a fact that is corroborated by the distributions of total scores obtained in different samples.

Normative Data

Table 14 gives preliminary normative data based on 19 samples of fourth-

Table 14

Preliminary Normative Data for Creativity Attitude Survey

Group	N	Mean	SD
Fourth Grade Boys			
Group A (P.S. 100)	48	15.75	2.42
Group B (P.S. 176)	22	15.32	2.83
Group C (P.S. 35)	26	14.42	2.65
Group D (P.S. 36)	49	15.57	2.29
Fourth Grade Girls			
Group A (P.S. 100)	56	16.64	2.61
Group B (P.S. 176)	36	16.39	3.39
Group C (P.S. 35)	53	15.15	3.06
Group D (P.S. 36)	58	15.64	2.96
Fifth Grade Boys			
Group A (P.S. 100)	27	16.48	3.07
Group B (P.S. 176)	39	16.31	3.42
Group C (P.S. 35)	28	15.29	3.92
Group D (P.S. 36)	33	15.45	3.23
Fifth Grade Girls			
Group A (P.S. 100)	49	19.29	3.71
Group B (P.S. 176)	40	16.57	4.13
Group C (P.S. 35)	49	17.76	3.82
Group D (P.S. 36)	41	15.59	2.96
Fifth Grade Classes (both sexes)			
Group A (P.S. 48)	43	15.00	3.21
Group B (P.S. 95)	75	18.24	3.72
Group C (Quaker Ridge)	67	21.64	3.81

and fifth-grade school children in the New York metropolitan area. For each sample, the table provides the number of cases and the mean and standard

deviation of CAS score . The samples include boys and girls from diverse socio-economic backgrounds. At the time of testing, the majority of pupils in P.S. 36, 48, and 100 were black or Puerto Rican children from lower socioeconomic areas of the Bronx, New York. Pupils in P.S. 35 and 176 were primarily black children from middle-class neighborhoods in Queens, New York. P.S. 95 is located in a white, middle-class section of the Bronx, while Quaker Ridge school is situated in Scarsdale, New York, a white upper middle-class suburb.

Reference to Table 14 indicates that girls tend to score higher than boys on the CAS. A relation to grade level is also apparent, the fifth-grade means begin generally higher than the fourth-grade means. With socioeconomic background, the relationship is less clear. The two middle-class white groups (P.S. 95 and Quaker Ridge) obtained relatively high mean scores. In the remaining, predominantly black and Puerto Rican samples, however, the children in the culturally disadvantaged neighborhoods performed as well as those in the middle-class neighborhoods, or slightly better. Finally, it may be noted parenthetically that in the teacher training study reported in Chapter III, 20 teachers took the CAS. That this test does not provide adequate ceiling for such an adult sample was indicated by the high mean (26.52 out of a possible maximum score of 30) and the low standard deviation (2.17). More data are needed, however, to establish how far above the fifth-grade level the CAS can be effectively employed.

Reliability

Estimates of internal consistency for the CAS were obtained by computing split-half (odd-even) reliability coefficients for two samples of fifth-grade children. For this purpose, a fifth-grade class was selected from two New York schools, P.S. 35 (Queens) and Quaker Ridge (Scarsdale). Reliability coefficients computed by the Spearman-Brown technique are .81 (P.S. 35, N=31) and

.75 (Quaker Ridge, N = 67).

A test-retest reliability estimate was computed for the normative sample from the Quaker Ridge school (N = 67). This sample was administered the CAS again after a five-week interval. The resulting product-moment coefficient was found to be .61.

Validity

If the CAS does, in fact, tap a favorable orientation toward creativity, children should show a significant gain on this instrument after they have been exposed to educational programs designed to promote creative expression. Two studies reported in Chapter III provide data bearing on this aspect of the construct validity of the CAS.

In the investigation of the effect of creativity training on fifth-grade school children from a middle-class and a culturally disadvantaged population, significant gains on the creativity battery attributable directly to the creativity training program were found only in the middle-class group. In this group, three of the six instruments employed in pretesting and posttesting showed gains in the experimental group that significantly exceeded the gains made by the control groups. The CAS was one of these three instruments. Moreover, in the 20-month follow-up of these children, the significant advantage was maintained on a single instrument, the CAS. Thus favorable changes in attitudes toward creativity, as reflected in higher CAS scores, seem to be a primary effect of creativity training programs, and these attitudinal changes appear to be relatively resistant to extinction over time.

Similar data were obtained with the creativity training program for in-service teachers, also summarized in Chapter III. In this study, the children taught by teachers who had participated in the training program made significantly greater gains on all four creativity tests than did the children taught by the

control teachers. Of the four tests, furthermore, the CAS was the only one in which all eight experimental groups (classified by sex, grade, and school) improved significantly from pretest to posttest.

Further evidence of construct validity is provided by the suggestive trends noted in the previously cited normative data.

Some evidence of concurrent criterion-related validity for the CAS is available from a study conducted with the normative group from the Quaker Ridge school. The fifth-grade Language Arts teacher at this school was asked to list all the pupils in her classes who had shown concrete evidence of written creativity as, for example, in an original poem or composition. This teacher was also asked to nominate pupils who were equally bright, but who had not given evidence of creative talent during the school year. A total of 17 creative and 16 control children were nominated. Comparison of the mean CAS scores for the two groups indicated that the creative group scored significantly higher than the control group ($t = 2.66$; $p < .05$) on the CAS.

In conclusion, available data on reliability and validity, though still meager, suggest that the CAS is a promising instrument for further research

CREATIVITY TRAINING MANUAL

In the course of the research on the development of creative thinking in children, reported in Chapter III, a large number of specific activities suitable for classroom use were explored. Some were new; others represent variations and adaptations of well-known techniques for stimulating creative behavior. Both in the pilot studies and in the major project on fifth-grade children in middle-class and in disadvantaged areas, these techniques were tried out by the project staff and their effectiveness was evaluated by a variety of procedures--both quantitative and qualitative. One of the concrete by-products

of this experience was a creativity training manual designed as a guide for teachers in the upper elementary school grades and the junior high school. Entitled Developing Creative Expression: A Sourcebook of Ideas for Teachers, this manual has been available since 1969 in mimeographed form and will be published under the same title in 1971 by Bruce Publishing Co.

The training manual in its final form was utilized in the creativity training program for in-service teachers described in Chapter III. A comprehensive evaluation of the effectiveness of the manual can be found in the report of that project in Chapter III.

The manual begins with a brief introduction giving a simple theoretical framework and general guidelines to assist teachers in their roles as "creativity evocators." The major portion of the manual is devoted to a description of 58 "ideas" for creative activities and novel use of materials. These ideas are offered as a pool from which individual teachers may choose those most appropriate to employ in their own classes. Designed to encourage imagination, self-expression, and divergent thinking (i.e., thinking that generates a diversity of solutions to a problem), the manual draws upon a wide variety of media. The activities involve not only oral and written verbal expression but also the creative use of visual materials ranging from paints, paper cutouts, and clay, to wire sculpture, puppet- and mask-making, and several types of montage; still other expressive techniques are illustrated by improvisations and skits. Some techniques are designed to stimulate richness of sense perception for sights, sounds, touch, etc. Several utilize ambiguous pictures, inkblots, symbols, incomplete stories, and other stimuli selected to encourage fluency of imaginative associations. Others require the child to identify with a designated person, animal, or object and to describe his feelings empathically. In all these procedures, major emphasis is placed on uniqueness and originality of responses.

The manual is copiously illustrated with diagrams and pictures and provides many examples of children's responses.

The 58 activities are organized under three major categories, each described in a separate chapter. Each chapter begins with a short introduction giving a general orientation and rationale for the group of activities that follow. The major categories are outlined below:

Ideas to Stimulate Sensory Awareness

Ideas to Stimulate Artistic Expression

I. Training in Visualization

II. Expression in the Visual Arts (Graphic arts; Constructions)

III. Prose

IV. Poetry

V. Dramatic Expression

Ideas to Stimulate Scientific Thinking (e.g., brainstorming, unusual uses).

Two examples are reproduced below:

Idea No. 26: Garbage Art

Try asking the children to make a "garbage art" sculpture, collage, or construction, using only objects that are discarded at home. For example, they might glue beer cans and soda bottles together to form an aesthetic object.

Idea No. 37: Stories Via Personification

To personify something is to imagine that it has life or personality. Ask the children to imagine what a lone, blackened tree would say if it could talk, or what a baseball would say after it had been hit and thrown around, etc. Their thoughts could be written or given orally. This exercise encourages children to become less egocentric by going outside their own frame of reference. It encourages the ability to empathize with others.

Personification Topics:

1. If a couch could talk, what would it say when someone sat on it?

2. One day you were out in a field watching your father chop down a tall tree. Suddenly the tree began to talk to you (and only to you), saying . . . .

3. If the following objects could talk, what stories would they tell?

a hamburger	a garbage can	a leg
a fire hydrant	a sidewalk	a nose
a telephone	a sewer	a puddle
an oven	a blackboard	a clock
a star	the moon	a mosquito
a house	an old car	a chewed-up piece of bubble gum

AUDIOTAPES FROM CREATIVITY WORKSHOP

The creativity training program for in-service teachers, described in Chapter III, comprises a set of 20 "sessions," some of which extended over more than a single one-hour period in our 27-hour training program. The initial "lecture" presentations of nine of these sessions were recorded on audiotapes. The recorded sessions were selected so as to provide a representative sample with regard to both ordinal sequence of sessions and content. Below is a list of the available audiotapes, together with the appropriate session numbers.

Session Number	Content
1	Teaching for Creative Endeavor. General Orientation
4	Brainstorming - Idea Generation
5	Brainstorming - Evaluation of Ideas
7	Brainstorming - Attribute Listing and Checklist Techniques
9	Synectics Approach. Use of personal and symbolic analogy
13	Developing Poetic Expression in Children
14	Risk Taking and Creativity
15	Creative Writing - Myths
20	Expectancy Effect in Creative Achievement

CHAPTER V

SUPPLEMENTARY STUDIES

In regard to their relationship to the primary objectives of the project, the 16 supplementary studies summarized in this chapter fall into a variety of categories. Some represent further analyses of data gathered in the project proper (Nos. 1, 2, 3) or more intensive study of individuals surveyed in the project (No. 4). Others involve the development and validation of instruments subsequently utilized in the principal project research; while still others were concerned with the further development of instruments previously used in the project. Thus five studies deal with the Franck Drawing Completion Test (Nos. 5-9), three with the Adjective Check List (Nos. 10-12), and one with the Barron-Welsh Art Scale (No. 13). A few, although independently conceived, served indirectly as pilot studies insofar as they explored procedures that were considered for use in parts of the project (Nos. 14, 15). Still others, designed to investigate specific hypotheses about creativity, enriched our understanding of results obtained in the main body of the project (Nos. 8, 9, 16).

The brief summaries of the 16 studies given below have been numbered consecutively but classified under three headings in terms of their relationship to the basic project. At the end of each summary are given references to published articles or in-house Research Reports listed in the Project Bibliography, where a fuller account of each supplementary study may be found.

FURTHER ANALYSES OF PROJECT DATA

No. 1 - Intercorrelation of Creativity, Intelligence, and Academic Achievement

Utilizing data gathered in the two biographical inventory studies, this investigation provides intercorrelations among the Guilford tests of Alternate Uses and Consequences, grade-point averages, and deviation IQ's from group intelligence tests in a sample of 989 boys and girls in grades 10 through 12. All the resulting correlations were significant at the .01 level. The two creativity tests correlated .31 with each other and only slightly lower with IQ and grades. A composite score on the two creativity tests correlated .225 and .222 with IQ and grades, respectively. When considered in the light of other published data, these results suggest that: (1) creativity, like intelligence, is not a unitary trait; (2) there is considerable overlap between the abilities covered in the two broad concepts of "creativity" and "intelligence."

Separate analyses for boys and girls revealed closely similar patterns of relationship among the variables. The chief difference was that all the correlations were higher among the girls--a sex difference also found by other investigators.
(Anastasi & Schaefer, 1971b)

No. 2 - Relative Validity of Biographical Inventory and Tests as Predictors of Creative Achievement

The biographical inventory developed in the studies of high school boys and girls was compared with three tests typical of those employed to identify creative individuals in terms of broad personality or stylistic traits, namely, Barron-Welsh Art Scale, Franck Drawing Completion Test, and Adjective Check List. The 31 available variables (1 biographical inventory score and 30 test scores) were correlated with the dichotomous creativity criterion in each of the four samples (classified by sex and specialty field). Through regression analysis, the optimal 3-variable batteries were chosen for predicting the creativity criterion in each of the four samples. The biographical inventory was the only variable that appeared consistently in all four batteries. In two of the batteries, it also had the highest correlation with the criterion of all variables investigated It was concluded that the biographical inventory provides an unusually promising tool for the identification of creative adolescents.
(Schaefer, 1969b)

No. 3 - Imaginary Companions and Adolescent Creativity

The relationship between reported incidence of childhood imaginary companions and adolescent creativity was investigated through a reanalysis of the biographical inventory replies of 800 high school boys and girls. A comparison of the frequency with which one or more imaginary companions were reported in each criterion group yielded significant differences ($p < .01$) in the hypothesized direction in two of the four groups: Creative-Writing Girls and Creative-Art-Writing Boys (76% of whom were included because of literary products). No significant differences between creatives and controls were found in the samples of Creative-Art Girls and Creative-Science Boys. The hypothesis thus received limited support in this study and was most clearly substantiated in the writing

field. The lack of significant differences in the other two groups is consistent with other findings reported in the major biographical inventory studies. (Schaefer, 1969a)

No. 4 - Case Studies of Exceptionally Creative High School Girls

In the effort to bring into sharper focus the life-history and personality correlates of creative achievement, case studies were conducted on 10 high school senior girls selected from the initial sample of 200 creative high school girls. These girls were identified as exceptionally creative on the basis of teacher nominations and specific creative products. Half had distinguished themselves in art and half in literary creativity. In addition to the information already available on these girls from the major study (biographical inventory, Barron-Welsh Art Scale, Franck Drawing Completion Test, Adjective Check List), they were intensively interviewed and given two projective tests--the Draw-A-Person Test and the Thematic Apperception Test. They also filled out the Adjective Check List to describe each of their parents and wrote a brief description of what they like best and/or least about themselves.

Among the experiential factors which seemed to make a significant contribution to the early development of the girls' creative life style were: noncontrolling parents with strong cultural-intellectual interests, friends and relatives who provided role models of creative behavior (father most prominent), outstanding teachers, and awards for creative achievement. The girls themselves manifested strong perseverance in the pursuit of their creative activities. Quite open to fantasy and feelings, they reported several unusual mental phenomena, including imaginary companions, synaesthesia, and déjà vu experiences. The multi-faceted self-concepts of the girls reflected a number of traits commonly associated with the creative person, including openness to change and impulse expression, imagination, curiosity, aggressiveness, autonomy, and emotional sensitivity. Their self-descriptions resembled more closely the girls' own descriptions of their fathers than their descriptions of their mothers. Although the girls gave signs of a need for high achievement, they seemed uncertain of actualizing their potential because they lacked confidence in their ability and appeared to have deep-seated conflicts in regard to masculinity-femininity and autonomy-dependency needs.
(Schaefer, 1970)

RESEARCH ON INSTRUMENTS FOR ASSESSING CREATIVITY

No. 5 - The Franck Drawing Completion Test as a Measure of Creativity

A short form of the Franck Drawing Completion Test (Items 1-12) was administered to the 800 high school boys and girls employed in the principal biographical inventory studies. This test consists of simple line drawings to be completed by the subject in whatever way "seems most fun" to him. The drawings were scored on five scales adapted or developed for this study: Elaboration, Flexibility, Asymmetry, Abstraction, and Originality. Scorer reliabilities were satisfactory, ranging from .81 to .95. Large and significant ($p < .01$) mean differences were found between creative and control groups on Elaboration, Asymmetry, and Originality, but not on the other two scales. Results were quite consistent across sex and specialty fields. It was concluded that the Franck

Drawing Completion Test--originally designed for a different purpose--is a promising instrument for identifying high levels of creativity.
(Anastasi & Schaefer, 1971a)

No. 6 - Validation of Masculinity-Femininity Scale of Franck Drawing Completion Test in an Adolescent Sample

Involving a reanalysis of data gathered in our project with high school boys and girls, this study employed the masculinity-femininity scale of the Franck Drawing Completion Test. This scale had been previously applied by other investigators to adults, college students, and children, but had not been tested at the high school level. For this purpose, a sample of 100 boys and 100 girls, stratified as to specialty field and creative vs. control status, was drawn and the test papers were scored according to Franck's M-F key. Scorer reliability on a random sample of 24 tests independently scored by two trained scorers was .80. The mean sex difference in scores was significant at the .001 level and the point-biserial correlation of score with sex was .305. This verification of the validity of the M-F scale with an adolescent sample was carried out as a preliminary step to the use of the scale in testing certain hypotheses regarding the relationship of sex role identification and creativity (Suppl. Study No. 7).

No. 7 - Creativity and Sex Stereotypy

The hypothesis to be tested was that the responses of the creative students of either sex on the Franck Drawing Completion Test show less sex stereotypy than do the responses of the less creative students in the corresponding control groups. Accordingly, the M-F scoring key was applied to the test papers of 240 students from the project's high school population, classified into eight equal groups with regard to sex, creativity status, and field of achievement. Analyses of variance failed to confirm the hypothesis. Although sex yielded a significant effect on scores ($p < .001$), neither creativity status nor field did so; nor were there significant interaction effects. It was concluded that those aspects of masculinity-femininity tapped by the Franck Drawing Completion Test--concerned chiefly with basic awareness of sex identity--are probably unrelated to creativity, in contrast to the more culturally based differences in attitudes and interests.
(Urbina, Harrison, Schaefer, & Anastasi, 1970)

No. 8 - Creativity and Projection of Movement Responses

The entire sample of 800 high school boys and girls employed in the major project was utilized in testing the hypothesis that movement responses on a projective test such as the Franck Drawing Completion Test are characteristic of creative persons. Published studies with other projective tests have yielded conflicting results regarding this hypothesis. In the present study, significantly more movement responses were found in creative than in corresponding contr groups among boys and girls in the art and writing fields. No significant difference was found for boys in the science field. Further classification of responses with regard to animal and inanimate movement yielded no significant differences; but there was a consistent trend for more of such responses to occur in the creative groups, again with the single exception of the science boys. These results are consistent with previous findings with regard to creative persons in artistic and literary as contrasted to scientific fields. They suppor

the hypothesis that openness to fantasy and impulse expression, as revealed by an excess of movement responses on projective tests, are associated with the creation of artistic and literary works.
(Bonifacio & Schaefer, 1969)

No. 9 - Novelty and Quality Dimensions on the Franck Drawing Completion Test

This study was initially designed to test the hypothesis that creative achievement requires a combination of novelty and quality, either alone being insufficient. Thus it was proposed that creative subjects should show less discrepancy between these two dimensions than would be true of less creative persons. The study required the development of two new scales for rating performance on the Franck Drawing Completion Test, designed to assess the dimensions of novelty and quality. These scales were then employed to score the test papers of 50 creative and 50 control high school boys in the Art-Writing sample, and 50 creative and 50 control high school boys in the Science sample. Although the results failed to support the initial hypothesis, both the novelty and quality scales yielded differences in the expected direction between creative and control groups. On the quality scale, the creatives scored significantly higher ($p < .01$) than the controls in both Art-Writing and Science samples; on the novelty scale, the mean difference in favor of creatives was significant at the .05 level in the Art-Writing group but failed to reach significance in the Science group.
(Sansone, Research Report No. 1)

No. 10 - The Self-Concept of Creative Adolescents

The reported self-concept of creative adolescents was investigated through an analysis of the data obtained with the Gough Adjective Check List (ACL) administered to the 800 high school boys and girls in the major project. The ACL consists of 300 adjectives arranged alphabetically from "absent-minded" to "zany"; the subject marks all the adjectives he considers to be descriptive of himself. The test was machine-scored for each of the 24 currently available trait scales described in the test manual, many of which are especially relevant for research on the creative person. In fact, the ACL had proved effective in earlier published research in differentiating creative adults from non-creative controls. Its application to an adolescent sample in the present study yielded many significant differences in the hypothesized direction. Although some of these differences were specific to one sex or field of achievement, several characterized the creative adolescent consistently across sex and field. Among the traits in which creative adolescents significantly excelled the controls are: self-confidence, lability, dominance, exhibition, autonomy, aggression, and change. Creative adolescents also tended to be more open and accepting of possibly unconventional behavior in themselves, as indicated by their checking more adjectives in general, as well as more unfavorable adjectives. The control groups, on the other hand, obtained significantly higher means in defensiveness, self-control, order, nurturance, and deference.
(Schaefer, 1969c)

No. 11 - Development of an Empirical Creativity Scale for the Adjective Check Lis

Besides the standard trait scales for which the Adjective Check List (ACL) may be scored (as in Suppl. Study No. 10), this test provides a comprehensive item pool from which new scoring keys or scales may be empirically developed against any desired criterion. Accordingly, item analyses against the creativity

criterion were conducted for each of the 300 ACL adjectives, with the data from the 800 high school students included in the major project. Separate criterion scales were developed and cross-validated in each of the four sex and field samples. Finally, a composite 27-item scale was prepared by combining items differentiating in the same direction and above a designated significance level in all four groups. In cross-validation, this composite creativity scale differentiated between criterion and control groups better than did any of the standard trait scales.
(Smith & Schaefer, 1969)

No. 12 - Generality of Trait Descriptions of the Creative Person

This study provided further evidence of the effectiveness of empirically developed creativity scales for scoring the Adjective Check List (ACL), as well as the generality of certain personality characteristics of the creative person. In an independently executed study, a 59-item creativity scale was empirically developed for the ACL through item analyses conducted in a group of college men. The creative students had been repeatedly selected by their teachers as creative achievers in their freshman, sophomore, and junior years, while the controls had at no time been so designated. In the junior year, faculty members rated students in both groups by checking the appropriate adjectives on the ACL, and the adjectives thus chosen were item-analyzed against the creativity criterion in the development of the 59-item scale. The development of this scale thus differs in three principal ways from that reported in Suppl. Study No. 11: (1) use of college rather than high school students; (2) data obtained exclusively on males; (3) adjectives checked by raters rather than by students themselves. Despite these differences, when the ACL responses of the 800 high school students in our major project were scored in terms of this scale, all differences between creativ and control groups were significant at the .01 level or better. The point-biserial correlations between creativity scale score and the creativity criterion ranged from .24 to .45. It should be noted, furthermore, that 19 of the 27 adjectives in the high school creativity scale also occurred in the college scale.
(Domino, 1970)

No. 13 - The Barron-Welsh Art Scale as a Predictor of Adolescent Creativity

Utilizing data gathered on both high school boys and girls employed in our biographical inventory research, this study was concerned with the validation of the Barron-Welsh Art Scale against our creative achievement criterion in the scientific, artistic, and creative writing fields. The Revised Barron-Welsh Art Scale consists of 60 black-and-white line drawings, for each of which the subject is asked to respond "Like" or "Don't Like." These items were chosen by Barron because they differentiated between criterion groups of artists and non-artists. Other published studies suggested the possible effectiveness of this test in differentiating creative from noncreative adults across various fields. There is also evidence of relationships between certain personality traits and Barron-Welsh scores.

Although in our study there was a consistent trend for the creative adolescents to score higher on this test than the controls, the only significant difference was found in the boys' Art-Writing group. Future creativity studies with this scale will thus need to take specialty differences into account. The fact that the creative and control boys in the science field were not significantly differentated on this test may be attributed to a field-related preference

by scientists for designs that are simple, balanced, and orderly in nature; such a preference would tend to lower scores on this test. The girls as a whole scored significantly higher than the boys, a sex difference also found by previous investigators. Both creative and control girls in our study, moreover, scored substantially higher than the reported norms for people-in-general, both groups approaching the reported means for artists and college students with creative writing ability. Thus the test's failure to differentiate between creative and control girls in our study may indicate insufficient discrimination at the upper levels of creative talent, at least in an adolescent population.
(Schaefer, 1968)

INDEPENDENTLY DESIGNED STUDIES ON CREATIVITY

No. 14 - The Influence of Training Upon the Organization of Creative Thinking

This study was designed to test the general hypothesis that experiential background contributes to the structuring of cognitive factors through the mechanism of transfer of training. An attempt was made to alter the intercorrelations and factor pattern of a battery of creativity tests through experimentally interpolated experience. Forms A and B of the entire Torrance creativity battery, yielding a total of 27 scores, were administered as pretests and posttests, respectively, to 134 fifth- and sixth-grade parochial school children. The children were divided into three experimental groups which received different amounts of intervening creativity training: 4 hours, 2 hours, and none. Factor analyses of pre- and posttest scores revealed suggestive changes in size and composition of factors.

Conducted at the same time as the pilot studies for the major creativity training project, this investigation also provided information regarding the nature of Torrance scores and the effectiveness of certain instructional techniques.
(Clarkin, Research Report No. 2)

No. 15 - An Experimental Evaluation of the Crutchfield Productive Thinking Program

In order to develop a child's ability to figure out problems for himself, Richard Crutchfield and his colleagues at the University of California (Berkeley) have developed a set of 16 self-instructional booklets for fifth- and sixth-grade children, in the form of short detective stories. These booklets provide systematic instruction and guided practice in the skills of productive thinking and problem solving. In the present study, the 16 programmed booklets were administered to a group of 28 fifth-grade children in a local parochial school, one or two booklets per week for 12 weeks. A matched control group of 28 children spent an equal amount of time with the same experimenter, working on standard reading exercises. Pre- and posttests included productive thinking problems and an attitude survey designed by Crutchfield, as well as the Unusual Uses test from the Torrance creativity battery. The hypothesis that the experimental group would gain significantly more than the control group from pretest to posttest was not supported. Among the possible reasons for such negative findings, in contrast to the positive results reported by Crutchfield, are the use of stricter controls in the present experimental design, as well as the effect of general verbal improvement (from the reading instruction given the control group) upon verbal problem solving.
(O'Flaherty, Research Report No. 3)

No. 16 - Maternal Personality Correlates of Sons' Creativity

Teachers in nine New York State high schools were asked to nominate male students who had produced some observable evidence of creativity. The schools were located in primarily middle- to upper-class suburban areas. The 114 nominees were further screened with the Medwick Remote Associates Test and the Guilford Alternate Uses test. A total of 48 students met the criteria; a control group of 38 students was matched with the creative students on sex, educational level, grade-point average, and geographical residence, but scored below the cutoffs on the screening tests and received no nominations for creative achievement. The California Psychological Inventory was administered to 33 mothers of the creative boys and 31 mothers of the control boys who accepted the invitation to participate in the study. In terms of significant mean differences on the various California Psychological Inventory scales, the mothers of creative subjects exhibited greater self-assurance, initiative, and interpersonal competence; they preferred change and unstructured demands; they were more insightful about others, more tolerant, and valued autonomy and independent endeavor. They were, however, less sociable, less conscientious, less dependable, less inhibited less concerned about creating a favorable impression, and less nurturant and obliging toward others than the mothers of the controls.
(Domino, 1969)

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